Scanning - Shortwave - Ham Radio - Equipment
Internet Streaming - Computers - Antique Radio

Monitoring Times

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HURRICANE SEASON 2008

Also in this issue:

- Citizen's Band at 50!
- Monitoring Illinois' StarCom21 System
- Programming made easy: Butel ARC-500

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Watch What Happens!

The SR2000A is an ultra-fast spectrum display monitor that lets you SEE received signals in FULL COLOR

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*Government version. Cellular blocked for US consumer version.

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***No audio available while displaying video signal on the LCD. If both video and audio need to be monitored simultaneously, an optional (external) TV2000 is required.

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WiNRADiO WR-G315e receiver enhanced with WR-AMFE-3500

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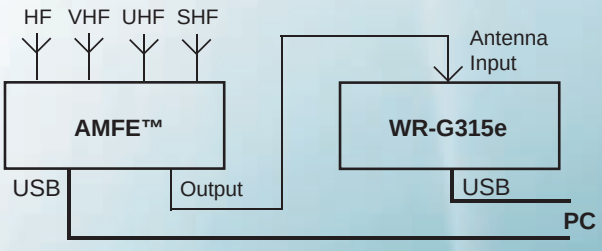

Our latest add-on for the popular WR-G315 series of WiNRADiO receivers redefines the idea of "DC to daylight", yet again.

The frequency range of the WR-G315 can now be expanded up to 8.6 GHz using the AMFE™ option (Antenna Multiplexer and Frequency Extender). This is the first time a receiver of such affordable price range can go that high in frequency.

And you also get an antenna multiplexer thrown in, making it possible to connect four antennas for different frequency bands directly to your expanded WR-G315: No more hassle with antenna switching!

- Input frequency range DC to 3500 (or 8600) MHz
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- Low noise figure
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- Suitable for any third-party receivers (AMFE-8600 only)
- Low-noise linear power supply included
- Application software included
- Programmers' API included to support third-party development

The AMFE™ unit interfaces neatly with the WiNRADiO WR-G315e or WR-G315i receiver. The receiver's application software is able to recognize the AMFE™ unit and expand the ranges of the frequency input and display automatically. Switching between the antennas and tuning the local oscillator for the downconversion is accomplished fully transparently to the user. The AMFE™ enclosure is similar to that of the WR-G315e receiver and stacks neatly on top or under it.

There are two models: WR-AMFE-3500 and WR-AMFE-8600 which extend the WR-G315 receiver's frequency range to 3.5 or 8.6 GHz, respectively. The AMFE™ units are USB controlled, supplied with application software and a linear AC/DC power adapter. The WR-AMFE-8600 model can be also used with third-party receivers, and can be optionally fitted with an OCXO for enhanced stability of 0.01 ppm, to suit the most demanding monitoring and surveillance applications.

Monitoring Times

Vol. 27 No. 8 August 2008

On our Cover

Hurricane Season

Once again, August ushers in the season of hurricanes. Favorite targets of many utility monitors are the hurricane hunters – aircraft and crews deployed by NOAA and by the Air Force to gather real-time data by flying into the teeth of the storms.

This month's *Milcom* column "Monitoring the Hurricane Season" (page 52) gives you all the tools you need to monitor the Hurricane Hunters during an active season. To keep up to date with local weather anywhere in the U.S., you can tune in to weather broadcasts on your computer. Check out *GlobalNet* on page 23.

On the cover a NOAA WP-3D snaps pictures of Katrina's eye wall, while the inset shows a P-3 flying in the eye of Hurricane Caroline.

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Citizens Band at 50 10
By Ken Reitz

The lowly Citizen's Band turns 50 this August. Scorned by many hobbyists, this service still serves a useful purpose and is "trucking" along. Though CB is a shadow of its former self, several hardware manufacturers are investing in the service by introducing new model CBs. The author puts several new models through their paces to see what's new, how they work, and how they compare.

If you've ever wondered what happened to CB, now's the time to revisit the old girl on her 50th birthday! At middle age, she's slowing down, but she's still got a lot of life left!

What's in the Back Room? 13
By Domenic Mallozzi

Pictures of public safety dispatch centers always display lots of computers and video monitors. But where are the radios? The author takes us on a tour of the back room at his local "public safety answering point" (PSAP) in Natick, Massachusetts.

Illinois' StarCom21 System..... 15
By Rich Carlson

Illinois' major statewide system was activated in the latter half of 2007 and is still being tweaked. The primary user of this Motorola SmartZone, APCO-2 compliant system is the Illinois State Police. Several counties are also coming on to the system, which is owned and operated by Motorola.

MT's comprehensive article by Chicago Area Radio Monitoring Association (CARMA) member Rich Carlson includes all StarCom tower sites, locations, IDs and frequencies, followed by all talkgroups known at presstime.

Reviews

Larry Van Horn says it's hard to teach an old dog new tricks, but I say his review of the **Butel ARC-500** software proves that one new trick often leads to another... Having long ago mastered computer technology, then trunking technology, Larry was surprised to have trouble grasping the organizational concept used in the new GRE scanners. But drawing on his bag of tricks, Larry went looking for software to help, and he found it in Butel's ARC-500 package, designed to work specifically with the GRE PSR500/600 series. Voila! Problem solved. (See page 66)

Voice command of your computer still seems futuristic, even a decade after its advent. But voice control of your radio by a $10 software program? Unreal! VR Commander makes it all so. (See page 72)

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Receives AM Band | Receives FM Band | Receives Shortwave Band | Alarm Clock | Headphone Jack

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- Multi-mode unit capable of receiving AM (synchronous), ISB, RZ-SSB, USB, LSB, CW, WFM including FM stereo, NFM, APCO-25 digital, and TV in both NTSC and PAL formats
- 6-inch TFT color panel can display received video signals or depict spectrum activity over a wide choice of bandwidths including a "waterfall" function to show signal activity over a specified time period

Welcome to the Future!

AOR proudly introduces the AR-ALPHA, the first in a new class of professional monitoring receivers! Designed to cover 10KHz to 3.3GHz, with no interruptions,* this receiver features a 6-inch color TFT display, five VFOs, 2000 alphanumeric memories that can be computer programmed as 40 banks of 50 channels, 40 search banks, a "select memory" bank of 100 frequencies, and a user designated priority channel. It includes APCO-25 digital and a DVR with six channels that can record up to a total of 52 minutes audio. Monitoring professionals will appreciate the world class engineering and attention to detail that makes the AR-ALPHA such an amazing instrument.

- Composite video output on the rear panel of the unit
- Selectable IF bandwidths:200 Hz, 500 Hz, 1 KHz, 3 KHz, 6 KHz, 15 KHz, 30 KHz, 100 KHz, 200 KHz and 300 KHz along with the ability to shift the IF.
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- Resolution bandwidth is also user-selectable in increments of 1 KHz, 4 KHz, 32 KHz, 64 KHz, and 128 KHz.
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- Use desktop or with 19" rack mount

The AR-ALPHA redefines excellence in professional monitoring receivers. No wonder so many monitoring professionals including government, newsrooms, laboratories, military users and more, rely on AOR.

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Authority On Radio

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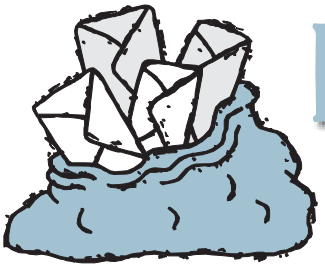


LETTERS TO THE EDITOR

This column is open to your considered comments. Opinions expressed here are not necessarily those of Monitoring Times. Your letters may be edited or shortened for clarity and length. Please mail to Letters to the Editor, 7540 Hwy 64 West, Brasstown, NC 28902 or email editor@monitoringtimes.com

Happy monitoring!
Rachel Baughn, Editor

Thanks for Your Generosity

We know subscribers read their magazines, because no sooner did the July *Monitoring Times* "express" version hit your computers, than we had three offers of shortwave radios for donation to our lady in Laredo (see July Letters). I'm sure more offers will follow as print subscribers receive their copies...

As it turned out, the first offer we received looks like the most appropriate receiver for this person's need. *MT* is also providing a subscription and an antenna to go along with the radio. We greatly appreciate your generosity: *MT* readers are the best!

John Musgrave: Adventures with the Bionic Ear

January 27, 2008

The "Bionic Ear" was reviewed in Jock Elliott's (Gadget Guy) column years ago. He seemed to enjoy it. He mentioned that it could be useful in SAR activities.

This reminded me of a time many years ago when I ran a speedboat up Knight's Inlet on Christmas Eve doing a last check for any survivors from a missing Islander aircraft. Every couple of miles I'd stop the boat and let off several blasts from an airhorn, then scan the shores with binoculars. No success.

I considered that if I'd had a Bionic Ear I could've done a sound-scan of the shores, too. So I bought one from the C Crane Co. Cost about $170. I find it an interesting and potentially useful piece of kit. It is, in my opinion, grossly overpriced. It's basically a microphone, headset, and amplifier with recording outlet and AGC. $70 would be a more realistic price.

Present onboard set-up in old galvanized first-aid box, with HF150, MFJ Reader. AR8600 and 8200III on common antenna/preamp.

The supplied headset has individual volume controls, sliders. The earphones are really inadequate and don't cover the ears, making feedback a problem. After about four years' ownership, with very occasional use, the earpads have deteriorated somewhat.

Some years ago I converted a pair of Peltor headset-type hearing protectors into a headset using two sets of drivers. This was so I could listen to my Lowe HF150 and monitor my Realistic PRO2006 at the same time. Somewhere over the years the headset had one set of drivers removed and became a very good mono headset, mainly used with my HF150 when running the engine on my boat.

A few days ago it occurred to me to try the Peltor with the Bionic Ear. I found I could crank the volume to max with no feedback. A vast improvement.

Another remembrance came to me of when two years ago my AR8600 picked up what turned out to be the leader of a pack of kayakers talking to a mother ship using Marine VHF. It was a strong, close signal, and information in it led me to believe the kayakers were in a close-by small inlet.

I scooted across to the rapids of a tidal lagoon, sat on a rock, and waited. In a minute about nine kayaks came in sight. They were rather nonplussed to note a bearded man studying them through binoculars. Some did wave back. The leader could be seen using his "handheld." They backed off and left.

Afterwards I realized I should've taken the Bionic Ear to listen to them.

Last spring I bought an AOR8200 handheld (from Grove, of course!). Hm! Thinks I! If I'd had the Bionic Ear and the 8200, I could really have monitoreed them. Hm! Thinks I again. If I converted the Peltor headset back to a two-driver set, I could listen audio *and* VHF.

So I found some mini speakers/drivers and installed them. Two plugs, one 1/4" phone, one 1/8" mini. Works very well when the "Ear" and the 8200 are paired.

Hm! Thinks I! What if I put a small stainless steel strap on the back of the Ear's parabolic reflector? I did so using pop-rivets to hold the strap in place. The 8200's belt clip slides on nicely and it is held firmly. The complete assembly is somewhat heavier than the Ear alone, but not excessively so. It doesn't feel clumsy.

It looks an impressive piece of spyware. A Yagi mounted on front of the Ear would make it look even more so.

So, next time my 8600 detects kayakers close by, the Ear, 8200, a Canon F1N with long lens, a tripod, and a birdbook go into a pack. If you're kayaking locally and come across a bearded man wearing a headset and using binocs to observe you – well, the camera, birdbook, and tripod are just "cover." Beware what you say – the Ear does have a recording outlet!

The Bionic Ear with AR8200III mounted on rear with headset with two sets of drivers/ speakers.

P.S. Can remember that years ago a writer to "Ask Bob" told how he powered up his scanner while holding down various keys, odd readings appeared on the read-out. He asked what this meant. Bob replied: "It means there's not much to do in Iowa in the winter."

I'm reminded of that every time I look at my Bionic Ear with the AR8200 perched on its rear-end. Well, not much to hear anyway! But who knows? Sometime in the next 20 years it may come in useful. After all, the gasoline pump which sits in the forepeak of my sailboat has put out one forest-fire and saved one boat from sinking in the past 18 years since I bought it!

John Musgrave, British Columbia

If you enjoy John's ramblings on all kinds of topics as much as I do, watch the *MT* website. If he agrees to it, we'll give John a regular spot at **www.monitoringtimes.com** as "Our man on the Oona River."

Correction

In July's Radio Restorations, please note the photos for Figures 3 & 4 do not match the captions; they are transposed. We apologize for the error!

REACT Teams like this one in Belmont County, Ohio, use all frequencies at their disposal – including CB, which celebrates its 50th anniversary this month. (Photo by Harry Baughn)

COMMUNICATIONS

by Ken Reitz

BROADCASTING

California Pirate Gains Following

Bored Coachella Valley, California drivers who have wearied of satellite radio, their 50-CD players, and 5,000-song iPods are getting excited about an intruder on their local FM band. Various media reports from the area state that the station, calling itself Cool-FM and operating on 103.5 MHz, had attracted attention, if not a market share.

The operators have shown marketing savvy as well as programming know-how. One local newspaper reported that pirate radio signs began popping up around the area advertising the station. A report in the *Desert Sun* said a male disc jockey even taunted listeners to find them. KESQ, News Channel 3 for Palm Springs, even drove around the area to do signal strength reports; they found that the pirate had quite a reach and warned that the FCC may be doing likewise soon.

Webcaster Gets Federal Protection for Call Sign

This past April WHAV, Haverhill, Massachusetts received government backing for use of its call sign through an unusual route. The broadcast entity, whose history dates from the late 1940s and included AM and FM broadcasting, is heard daily with a full broadcast schedule on two separate stations.

Through an extraordinary history of changes (**www.whav.net/vintage.html**) that included a swap with the local police station to get the WHAV call, the station lives on as a web-only oldies broadcaster. To protect themselves from over-the-air broadcasters requesting the call via the traditional call sign route through the FCC, WHAV has registered their call through the U.S. Patent and Trademark Office.

LPTV Stations Benefit from War Budget

A report in **TVTechnology.com** says that money to help low power TV stations make the switch to digital TV is contained in the current appropriations bill for the wars in Iraq and Afghanistan. The report said the Senate had approved the bill with a veto-proof margin before sending it to the House of Representatives.

ESPN RADIO

HD-RADIO

ESPN Radio Offers HD2 Programming

According to satellite industry trade newsletter *SkyReport*, ESPN Radio® launched the first national programming network for HD Radio stations the first week of June. The popular full-time, sports radio network said it will make all types of sports content available to 1,714 stations broadcasting with HD Radio technology.

The announcement comes at a time when most stations switching to the HD multicast format are doing little with their additional capability. The move could signal the beginning of cable-style content coming to the FM band and presenting serious competition to satellite radio. Can CNN and Fox News be far behind?

PUBLIC SERVICE

Digital EAS on the Horizon

Radio World On-line is reporting that FEMA will begin trials of a digital Emergency Alert System (EAS) in eight states this summer. The system, using a Common Alerting Protocol (CAP), is designed to take advantage of digital technology that allows broadcast stations to broadcast various weather and civil emergency messages through a common digital format. The scheme is mandated by the federal government to begin within 180 days of the standard being published in the Federal Register. But, broadcasters are concerned about the expense this new system will impose and others are concerned about the legal issues involved. Stay tuned, as they say.

Meanwhile, don't look for NOAA weather stations to change. While they are fully automated and digitally controlled, the analog broadcasts should continue for many years to come. It's doubtful that there would be any sense in switching the thousands of NOAA WX stations to digital transmitters and forcing everyone to buy digital receivers to pick up the signals. Then again, that's probably what many thought about TV and FM radio.

Ham Aids in Sea Rescue

A report in the Shenandoah (Iowa) Valley News told of a local ham who was scanning the 20 meter band after work and heard a boater off the Florida coast asking for help on the Maritime Mobile Service Net (MMSN) on 14.300 MHz. Unfortunately, the report did not list any of the call signs involved. According to the article, the net control station (NCS) for the net lost the boater's signal, which is where the Iowa ham came in. He copied the message and was able to talk to the boater who was trying to use a portable GPS device to figure out his location when the Iowa ham lost the signal. Then a ham in Maryland, who could copy the boater's information, relayed the fix to the NCS. Now, they had all the info they needed to alert the Coast Guard who located the boater within 25 minutes of the first call.

The episode points out a number of things to remember. Boaters should not put to sea without adequate radio equipment and at least a handheld GPS unit. And, no matter how tedious the task seems at times, nets such as the MMSN need reliable volunteers as NCS stations and as many hams throughout the country to help. It's also important for non-participating hams to stay clear of genuine service nets.

And, there's a role for shortwave listeners as well. Being able to accurately copy emergency information being relayed and being able to forward that information to the NCS or Coast Guard might help. Band conditions change all the time, especially during the summer and low part of the solar cycle. It's possible for NCSs to lose stations calling; that's when they will call for a relay. Call in only if you can actually hear the station calling and you can actually reach the NCS station, otherwise you'll just add to the confusion.

For complete information about the Maritime Mobile Service Net go to: http://mmsn.org. The net operates from 12:00 pm to 10:00 pm ET. If you're a ham, monitor the frequency for some time until you are familiar with operating procedures of the net before checking in. They are a very friendly group of seasoned hams and, if there's not an emergency happening, they'll be happy to check you in. To read a five part series about the net that appeared in the Coast Guard News in June go to: http://coastguardnews.com/the-maritime-mobile-service-net-part-1/2008/06/23

GPS NEWS & HIGH JINKS

State Court OKs GPS Tracking

According to a report in the *Albany* (NY) *Times Union*, an appellate division of the New York State Supreme Court found that placing

tracking devices on vehicles, as long as they are in public view, is legal. The ruling stems from a case in which the police put a GPS tracking device on the bumper of an individual's car without that person's knowledge. The person inadvertently allowed the police to trace his criminal activities that night and enter the data as evidence. The court said such ability could be a powerful tool in investigating the illicit drugs trade.

OnStar Locates Missing Funeral Car

An article in the *Windsor* (Ontario) *Star* detailed the misadventures of two would-be car thieves who couldn't resist the 2008 Buick Enclave sitting unattended with the keys in the ignition. Apparently unperturbed by the fact that the vehicle was adorned with two purple funeral flags, was sitting in front of a funeral home, first in line in a waiting funeral procession, the temptation was too much.

Unfortunately for the witless duo, the car was equipped with OnStar service, the General Motors motorist-assist system designed to help owners cope with trials of using a modern vehicle. When funeral officials saw the vehicle was missing, they called OnStar to find out where it was and called the local police to track it down. The rest, as the great detective once said, was routine.

Communicating with the Dead

An article from the *Boston Globe* relates the controversy surrounding a plan by a local Catholic Archdiocese to lease property on the edge of its cemetery to cell phone company T-Mobile which plans to erect a 100 foot cell phone tower there. According to the report, "a T-Mobile executive said the graveyard tower is needed to improve what are commonly known as dead spots…"

EPIRBs in the News

According to an article in *The Log*, California's #1 Boating and Fishing Site, boaters are reminded that after February 1, 2009, older Emergency Position Indicating Radio Beacons (EPIRB) transmitting on 121.5 or 243 MHz will no longer be monitored by satellite.

The problem is that some boaters are not disposing of their old EPIRBs properly, the result of which can be unintended activation of the beacon. The report cites an instance when an EPIRB was tossed in a trash can in Oregon while the owner's boat was being reworked in dock. The signal was picked up by satellite monitored by the Air Force Rescue Coordination Center in Virginia and relayed to the sheriff's office, which activated volunteers from the local Amateur Radio Emergency Service, who dutifully found the device in the trash can. The Coast Guard reminds boaters and other users to remove the batteries before discarding the device.

The BBC reported a hiker's rescue from his cross-Scotland trek. The 60 year-old hiker was experiencing medical problems and sent a GPS text, which was received by commercial GPS monitor GEOS in Houston, TX. The firm notified Scottish police just 15 miles from where the hiker sent the message. The police notified their operations center in Inverness to verify the report, which in turn notified the RAF Aeronautical Rescue Coordination Center, that dispatched a helicopter, that took the afflicted hiker to a nearby hospital.

DTV TRANSITION

Television Transition Confusion

An article in the *Washington Post* quotes a report from the Government Accountability Office (GAO) that surveyed 1,010 people who were still confused on the DTV issue. Apparently, two-thirds of those in the GAO survey who wanted a coupon, didn't know how to get one.

More telling, though, was that, of the first 800,000 coupons released and due to expire as the report was written, fewer than half were redeemed. Many consumers are not finding the features they want or need on eligible converters. Rules currently in force don't allow re-application for unused coupons. The National Telecommunications and Information Administration (NTIA) in charge of the program may consider changing the rules to allow coupons to be re-issued.

Looking at Indoor TV Antennas

Rabbit ears just don't cut it for HDTV reception in some urban and suburban environments. One company hopes to cure reception issues with a new indoor, amplified TV antenna. It's made by Toptronics and, according to their press release, is designed to receive channels 2 through 69. The DA-001 was designed in conjunction with Antennas Direct and claims reception out to 50 miles. The antenna measures 12" x 8" x 13."

There are many indoor antennas being cranked out by the container-load in a variety of designs. Most are suspiciously like the same indoor antennas of old but with "HDTV Capable" stickers attached. Many years ago antenna makers put stickers on their products that read "Color TV Antenna." Consumers could use a little help trying to sort through the available products, but there's no help from retail stores. Salespeople either don't know any more than consumers or simply push whatever's most expensive.

There is a web site that might help, called HDTV Antennas Lab (**www.hdtvantennaslab.com**). It appears to be a non-commercial, unbiased, consumer-oriented place for information about HDTV antennas. A large number of brands and models of indoor and outdoor antennas are listed with reviews from everyday users. The reviews offer practical advice for other consumers and may help you make a decision without having to spend a lot of money. There's also useful information on HDTV reception in general, that could help consumers understand what they're up against in the HDTV transition.

FCC ENFORCEMENT ACTION

More Unlicensed AM Transmitters

A St. Louis, Missouri man was ordered to pay a $7,000 fine for marketing uncertified AM transmitters on his web site. The entrepreneur claimed he was unaware certification was needed and anyhow he didn't have that kind of money. After reviewing his tax returns from the previous three years, the FCC agreed and reduced the fine to $610. In the Forfeiture Order the FCC also noted that, incredibly, the man continues to market the devices on his web site and warned him to stop. Maybe if he sells a couple more transmitters he'll have enough cash for the fine.

CBer Guilty and Broke

Last summer, neighbors of a CB operator in Tampa had grown tired of the interference he was causing and sent their complaints to the local FCC office. After a visit, the FCC confiscated a linear amp and modified CB set. But a month later, when complaints persisted, they sent a letter restricting his operating time from midnight to 6a.m.

The following month, the FCC inspected the station to see how he was coping with the restrictions. Lo and behold, they discovered two linear amps among his gear. Once again he surrendered the illicit equipment. Two months later they got more complaints and, tuning in, they recognized his by now familiar voice. After another trip to his house to inspect his station that day they found that his CB set was two watts under the maximum but a tell-tale coax leading to yet another linear was discovered. FCC agents also glanced at an open notebook showing log entries that indicated he had been making long distance contacts that morning.

Apparently, they had had enough. Ten days later the FCC issued a Notice of Apparent Liability for Forfeiture in the amount of $10,000. But, after having to buy and re-buy all that illicit gear, he simply couldn't afford the fine. The FCC agreed and reduced his fine to $350.

"Communications" is compiled by Ken Reitz KS4ZR (*kenreitz@monitoringtimes.com*) from news clippings and links supplied by our readers: Many thanks to this month's fine reporters: Anonymous, Rachel Baughn, Mark Cobbledick, Bob Fraser, Bob Grove, John Mayson, Larry Van Horn.

CITIZENS BAND at 50
Still Useful, Still Scorned

By Ken Reitz KS4ZR

Ranger Communications offers SSB CB sets (but none with NOAA WX) including this snappy set with a flag motif. The TR-127FST "Free Spirit" unit also sports a digital frequency counter and sells for $120. (Courtesy: Ranger Communications)

On a cold January morning this past winter, the local NOAA Weather radio station was warning of a warm air front that was moving into our area, over-riding a cold front that might cause rain to freeze when it hit the road. The system caught most people unaware and those on the road faced a tricky commute that day. I switched on the scanner and heard a deputy sheriff asking other units to seal off a road that had turned into an auto ice rink. Cars were in the ditch and backwards in every lane. A school bus was in a ditch. Another deputy called in and said *he* was in a ditch.

I wondered what the road conditions were like on the Interstate at my end of the county, so I switched on my 2 meter rig to monitor a local repeater. Long-winded tales of the medical woes of the usual repeater crowd was all that could be heard. Then I had an idea. I ran to the closet, dusted off my 24 year-old Cobra 18LTD CB set, hooked it up to a power supply, fed it with my all-band wire antenna and tuned to channel 19. Truckers were giving the location of every patch of black ice, every wreck, and every sighting of "smokey." They cautioned each other to slow down, noted the current temperature readings and relayed reports of possible icing conditions for 10 miles either side of my location.

I realized that this hopelessly outmoded communications service that had been by-passed by one of the most exciting periods of electronic development was, in fact, still the perfect thing for close-by, weather related emergencies.

CB Radio at 50

The FCC established the 27 MHz Citizens Band by a Report and Order published in the Federal Register on August 9, 1958 that took effect September 11, 1958. While most industries or institutions turning 50 years old would be bringing out the celebrities and seeking photo ops with national politicians, for CB radio there will be little if any fanfare, paparazzi, A-list celebs or even B-list celebs.

In the estimation of many hams, there are few things more contemptible than being a Citizens Band radio operator. The term "CBer" is often used on the ham bands to designate a "lid" or poor operator. And, anyone who has bothered to monitor any of the 40 channels that comprise the very small world of Citizens Band radio can believe the epithet is well-deserved.

No doubt the intentions of the FCC were well meant when it designated the frequencies in what was formerly the 11 meter amateur radio band to the new Citizens Band. It hoped to establish a low-power, personal radio service which, while still requiring a license to operate and an FCC issued call sign with which to identify, would allow normal citizens with little technical background and modest equipment to communicate with each other within a radius of a few miles.

When you consider that this was at a time when such communications were limited to savvy ham radio operators or the super rich with bulky car telephones, it was a pretty neat idea. The first CB radios weren't small or cheap. They were tube-fired and crystal controlled on only 23 channels. Still, for those who got into CB radio, it was a sensation.

As the '60s gave way to the 1970s, CB remained a minor radio hobby niche. There were several national magazines, notably *S9* and *CB Radio* magazine, devoted to the hobby, as well as several well-organized national clubs that attempted to maintain CB as a public service.

Some semblance of that period remains even today with REACT (Radio Emergency Associated Communication Teams), an organization founded in 1962 to use CB radio to help motorists. REACT was responsible for the FCC designating channel 9 as the national emergency channel. At its peak in 1974, REACT had 74,000 members. Today, REACT utilizes Family Radio Service (FRS) frequencies in addition to traditional CB channels and works to help members study for their Technician Class amateur radio license. Most REACT board members are licensed hams.

It took the oil crisis of the 1970s, which resulted in a national 55 mph speed limit, and the outrage of the easily outraged independent truckers against that limit, to turn this going-nowhere technology into a national craze. In order to locate gas stations still selling gas or avoid radar speed traps, almost overnight millions of Americans put CB radios in their cars. CB lingo permeated every aspect of popular culture and was prominent in Top-40 tunes and feature films. CB operators were everywhere, from the smallest Appalachian shack to the White House.

CB Today

In a way, CB radio is like a virtual museum of yesterday's electronic communications: still confined to 40 channels; still limited to 4 watts output; still almost exclusively using AM transmissions; and still almost useless beyond a few miles of ground wave propagation. Brand-new CB radios look almost exactly as they did 25 years ago: glitzy, chrome-plated plastic front panels with analog slide-rule S-meters and bright red LED channel designators. No money lost here in R&D; no need to re-tool these factories.

Depending on where you live, it's almost rare today to see a CB antenna on a "four wheeler," though in the country they're still *de rigueur* on pick-up trucks, especially during hunting season. The Citizens Band is mostly the domain of the trucking world. It's still the "water cooler" for the men (and a few women) who run the short-haul and long-haul routes. Talk is generally of what's wrong with their trucks, dispatcher, company, and dogs, though not necessarily in that order. Channel 19, still the main communications channel, is often quiet until someone spots "smokey" rolling or in the median strip.

The monitoring of channel 9 by state police and highway patrol is being abandoned. In my state (Virginia), according to a spokesman for the Virginia State Police, "[we are] in the process of implementing a Statewide Agencies Radio System (STARS). As STARS equipment is installed in the vehicles, the CB radios will be removed." The spokesman said, "The general public is not using CBs as they once did." Monitoring of channel 9 is now done only in areas served by dedicated teams of local CB operators that are still active.

One place that CB has made a big splash is with the street racing set. Street racers are the twenty-somethings in cities driving those very small import cars sporting massive wings on the back end and extremely large tail pipes that make the cars sound like crazed sewing machines on steroids. CB sets let them organize races and watch for police. (No doubt they think they invented this system.)

While the FCC allows Single-Sideband (SSB) transmissions on all 40 CB channels, only a few models are FCC certified, and those are priced considerably higher than AM models. There are several non-FCC certified sets available from dubious retailers that allow higher output and out-of-band operation. These radios are illegal to manufacture, sell, and even own.

They subject the makers, sellers, and operators of such equipment to the possibility of hefty fines and confiscation of equipment by the FCC.

CB Gets a Makeover

There are few places in the American electronics industry that have remained as static as CB radio, but that hasn't prevented some manufacturers from attempting a long overdue makeover. Among those trying to update CB's image are Cobra, Midland, Radio Shack and Uniden. All have new models with some pretty interesting features. Three improvements of note are "micro-CB" sets, the addition of the NOAA WX band on some models, and Bluetooth® capability on one set. I received demo units from all four manufacturers and made extensive road tests to see how they perform.

Cobra:

Cobra has three innovative radios among its impressive line-up. The HH38WX-ST is a handheld unit with built-in NOAA WX radio and features Cobra's SoundTrack® noise reduction system. It can be used as a mobile or portable unit, has hi/lo power switch to save batteries, speaker/mic jack and removable BNC antenna connector to switch to mobile mount antenna or base antenna at home.

Cobra's 75WX-ST has built-in WX radio, unique remote mount, noise reduction and keeps all controls right in your hand. Retails for $129.95. (Courtesy: Cobra)

Cobra's 75WX-ST is a micro-sized, remote mounted CB/WX set that allows mounting under a front seat, under the dash or, thanks to a unique mounting plate, in-dash. The generous 3-foot long, coiled radio/mic cord can be stretched to over 6 feet. The combined radio/microphone measures a little over 4 inches long, 2.5 inches wide, 1.75 inches deep, and has a full-featured, lighted LCD display, separate volume and squelch controls, front mounted CB/WX, scan, lock and memory buttons. The 75WX-ST also has Cobra's unique noise reduction circuit.

Cobra's 29LTD-BT is similar to many full-sized, traditional mobile/base units, but has the distinction of using Bluetooth technology to let the user answer cell phone calls through the CB unit. Once the radio is configured with a cell phone, when a call comes through, the operator presses the special Bluethooth button on the front of the noise-cancelling mic; the CB portion shuts down and the phone conversation takes over. The operator uses the mic to talk and hears through the CB speaker. To end the call, the operator just presses the Bluetooth button again. Redial of the last number called is possible by pressing and holding the blue button for two seconds. This set has channels 9 & 19 priority switches, mic gain, noise blanker/automatic noise limiter, CB/PA, and SWR calibration switches.

Cobra's 29LTD-BT continues a long line of reliable, full-sized CB set;, this one is Bluetooth capable and lets you use your cell phone through the radio. No WX reception. Retails at $189.95. (Courtesy: Cobra)

Midland 75-822 is the smallest and the most versatile CB/WX Handheld unit with 3-way power, speaker/mic plug and BNC antenna connector in a very small package. Retails for $99 at Target. (Courtesy Midland Radio)

Radio Shack's TRC-241 Hand-held CB with Weather Alert feature and BNC antenna connector. It's second only to Midland's micro-CB. Retails for $99.99 at Radio Shack. (Courtesy: Radio Shack)

Midland:

As expected, Midland has a large selection of CB sets. The most interesting is the 75-822 hand-held "micro mobile portable CB" which employs 2 meter-style design and features a 7.5-inch "rubber duck" antenna, 3-way power supply, detachable battery pack, and mic/speaker jacks. The unit comes with a mobile adapter that breaks the unit down to a scant 3.5 inches, about the size of many old CB microphones. The mobile adapter also features a cigarette adapter plug and full size SO239 antenna plug. This lets you use the entire set as a microphone that can be hung on any mic holder.

Radio Shack:

Radio Shack has its own extensive line of CB sets, and offers Cobra and Uniden sets as well. I tested their handheld model (Cat. #21-1679) that can be reduced to a mic-sized set. It features mic/speaker jacks and a power port just above the removable battery compartment. One advantage to this unit is the removable Ni-MH battery pack. It also comes with a standby AA battery pack (you provide the six AA batteries), 12 volt power jack and battery charge jack.

Radio Shack's mobile/base unit, TRC-447, was an outstanding performer. Its NOAA WX reception was able to receive three channels (the hand-held units could pick up only the strongest nearby NOAA station). Sensitivity on the CB channels was excellent and the transmit/receive audio was the best of the mobile units. It was, however, large (7.25 inches wide x 2.25 inches high x 8.5 inches deep). While there might be plenty of room in an 18 wheeler's cab for a radio this big, it might be hard to set up in some of today's mini-sedans.

Radio Shack TRC-447 is a full-sized, full-featured mobile CB radio with auto channel 9/19, weather alert LED and enough knobs and switches to keep any trucker happy. Retails for $129.99 at Radio Shack. (Courtesy: Radio Shack)

Uniden:

Uniden's Pro 538W mobile unit has a front-firing speaker, which is a plus, but can only receive three of the seven NOAA WX frequencies. I found it was not as sensitive in receive as even the Midland Micro-CB or the Cobra 75WX-ST, both of which can tune all seven plus three Canadian WX frequencies.

Uniden Model PRO538W CB/NOAA WX radio has front firing speaker, channel 9 priority button, but only three NOAA WX channels. Retails for $69.99 at Target. (Courtesy: Uniden America)

Real World Operating

I tested all mobile and handheld units in the car, powered through the lighter and attached to a roof-mounted Radio Shack antenna with a 39-inch whip. Traveling in all directions, I

Cobra's 148GTL is one of a few models to offer AM as well as upper and lower sideband transmissions, but no NOAA WX channels. Retails for $155 at Universal Radio. (Courtesy: Universal-Radio)

found that the maximum distance for reliable communications was about three miles for all units. None drastically outperformed the others in that regard. But, there were great differences in receive and transmit audio and, as any ham will tell you, the better your audio, the better your chances of being heard, especially in an emergency. The Radio Shack TRC-447 had the best overall audio in both transmit and receive. It was able to receive stations other units couldn't. Its audio seemed the best balanced, not too mushy and not too raspy.

Using the Radio Shack and Midland hand-held units as walkie-talkies, I was able to maintain readable signals at up to 1/4 mile away. In the car, both hand-held units with rubber-duck antennas were totally useless. I couldn't copy any stations and nobody could copy me. Attached to a mag-mount antenna, both units performed quite well on the highway. Anytime I keyed up the mic I got a response.

Making a choice when you buy a CB depends on what you need. If you have a large vehicle and use a cell phone a lot, Cobra's 29LTD-BT is just what you need. If the Bluetooth option isn't important, the Radio Shack TRC-447 with WX reception is great, but you'll need a big vehicle. If space is tight, Midland's 75-822 or Cobra's 75WX-ST work well. Between the two, I give the edge to the Cobra 75WX-ST for the simplicity and versatility of installation, easy access controls and SoundTracker feature.

Dwindling CB Antenna Options

Things have really changed in the availability of both mobile and base station CB antennas. Years ago, dozens of companies made CB base antennas, but that number has been significantly reduced and their availability has become scarce. No doubt this is because there are far fewer people operating CB radios from their homes. Radio Shack used to carry both base and mobile antennas, but now offer only a small selection of Mobile CB antennas. Mobile CB operations require an antenna mounted outside the car. Mag-mount antennas are relatively cheap (around $30) and durable. The difference between a center-loaded mag-mount and a base-loaded mag-mount are negligible. Again, the "rubber duck" antennas on hand-held CBs will be totally useless inside a car.

If you have an all-band antenna such as a G5RV or similar off-set fed dipole, you'll find that it works well on CB as a base antenna. Similarly a three element tri-band beam for ham radio works very well on CB. The poor distance achieved in transmitting will be due to low power (4 watts) and operating on ground wave propagation.

While listening, you'll notice that there are many stations putting out "bodacious" signals from hundreds of miles away, but that's because they are running large, illegal linear amplifiers and using multi-element beam antennas at significant heights. You will be very lucky if your signal makes it past the county line.

Devant One 5/8 wave CB base station antenna from Mosley Electronics, one of the few companies still making CB base station antennas. Order direct from Mosley at 800-325-4016. (Courtesy: Mosley Electronics)

There are two old CB antenna makers still in the game. The Mosley Electronics company makes a number of CB base antennas, including their Devant One (see photo). Shakespeare, another old CB antenna maker, is concentrating its sales on the seemingly unending power boat market and sells their antennas as marine/CB combos.

Last Word

With the popularity of FRS radios and the dominance of cell phones, it may seem irrelevant to even think about having a CB radio. But, when it comes to emergency situations, particularly weather related emergencies; it's possible that CB radio will be the only thing that still functions. Past experiences with hurricanes have shown that cell phone technology is the first thing to collapse. Overwhelmed by panicked users, shut down by power outages, or simply toppled by winds, cell phones aren't very reliable in emergencies.

FRS is great, but there is no nationwide channel on which you can be assured someone will hear your call. In that sense, CB provides just a little bit more security. A CB also helps you avoid being trapped in an Interstate "parking lot" by knowing what's ahead, and with a built-in WX radio you can also keep abreast of NOAA weather and civil emergency announcements.

Thanks to the innovations of CB manufacturers who stayed in the game, this 50 year-old radio service still has a little life left in it, particularly for today's commuters and vacationers.

FOR MORE INFORMATION:

For complete FCC rules on CB operations go to: http://wireless.fcc.gov/services/index.htm?job=service_home&id=cb

REACT International CB Radio organization:
www.reactintl.org
5210 Auth Road Suitland, MD 20746
301-316-2900

FCC RULES

(For what they're worth...)

Comparing an FCC CB rule book from 1978 to current rules shows that there have been relatively few changes. There used to be 45 rules, and that's been pared down to 28. Most manufacturers supply the basic rules with the purchase of a set. Complete rules are found at the FCC web site listed elsewhere on this page. Here are a few of the more interesting ones.

- Decades ago the FCC dropped all requirements for licensing CB radios. They don't require any form of station ID. But, in their rules, they suggest that you create your own call sign by starting with the letter "K," adding your initials followed by your ZIP code, seriously (Rule 17).
- FCC rules forbid the use of amplifiers of any form or for anyone to perform any modifications to the inside of an FCC-type accepted CB radio that would enable it to do anything other than operate as intended by the manufacturer (Rules 11 and 25).
- Your CB antenna can be no more than 20 feet above the support structure and, in no case, more than 60 feet above the ground (Rule 8)
- You are required to limit conversations with any one station to 5 minutes on and 1 minute off any channel (Rule 16).
- If sunspot activity is hot and the gods of the ionosphere smile on your 4 watts, you are not allowed to communicate with anyone over 250 kilometers or 155.3 miles (Rule 13). And, if you live near a border you may not make contact with stations in other countries, except General Radio Service stations in Canada (Rule 13). So, give up your dreams of working CB/DXCC.
- You can use a phone patch with your CB set, but you must have another operator physically make the connection to an FCC-approved phone patch (Rule 20). Good luck with that, since few manufacturers still make phone patches.
- If you are a licensed ham, you are not allowed to operate your ham rig on the CB frequencies. But, you can modify any CB radio for operation in the 10 meter ham band. When 10 meters opens up, you'll hear quite a few hams using modified CB sets on the AM portion of 10 meters. They are also frequently modified for use as beacon transmitters and are prized by 10 meter beacon operators for their sturdiness and low power output.
- The FCC allows subaudible tones, for tone-operated squelch for instance, and audible tones that do not last more than 15 seconds (Rule 12).

It's unlikely you would ever hear from the FCC if you were to break a few of these rules: have your antenna at 70 feet, talk for 20 minutes at a time with another station, or even talk with another station 160 miles away. About the only way you will gain the attention of the FCC is to irritate someone else into filing a complaint against your station: for example, causing interference with a neighbor's TV or telephone. Even then you'll likely receive a letter informing you of the issue and asking you to correct the problem. If the complaints persist, then the rules basically give the FCC the right to enter your home and remove offending equipment and hit you with a hefty fine to keep you from doing it again. So, play by the rules.

What's in the Back Room?

By Domenic Mallozzi, N1DM

When you look in *Monitoring Times* or other scanning hobby magazines, you see plenty of dispatch center pictures with computers and monitors. But where are the radios and how do these computers operate the radios?

In most cases, the radios are either in a back room or at a remote location. In our town, the police department's public safety answering point (PSAP) has multiple back rooms for electronics (radios, phone system and servers). In this article I will show you pictures of the equipment in the 'radio room' of a typical communications center.

The installation shown here is for the Town of Natick, Massachusetts, and it is part of the police operated public safety answering point. Natick is about 17 miles west of Boston and is a member of multiple police and fire intercity networks. The town has a population of 30,000 that swells during the day, due to a large mall, a military installation, and multiple large businesses in the town.

Both the police and fire departments are full time professional organizations. The PSAP is operated by the Police Department and is staffed by professional dispatchers and dispatches police, fire and emergency medical responses in the town. The PSAP was activated in 1999 and used a combination of equipment from our previous dispatch centers and new equipment. Since the original installation, some additions and improvements have been made, including a traveler's information system (TIS) station.

Centracom Gold front view

The heart of the operation is a Motorola Centracom Gold® dispatch console system which has a PC at each dispatch position to talk to a custom system computer, which is basically a client server configuration. This system allows the dispatch position to have access to all channels and perform a huge amount of different communications tasks.

Each dispatcher has two speakers he can independently set at a desired level, allowing the dispatcher to independently set the volume for a primary channel and the second to monitor multiple channels, like intercity police. The dispatcher has a computer screen and a mouse that allows him to select functions. The functions include:

- Control of three town public safety repeater systems
- Access to three backup public safety repeaters
- Monitoring and control of repeater remote (satellite) receivers
- Access to five police and fire intercity radio systems
- Access to town emergency management system radio
- Access to town public works remote transmitter site
- Cross-patching one channel to another
- Transmitting alerting tones for fire stations
- Control of auxiliary equipment (i.e.: station garage doors)
- Remote override of traffic signals
- Tying one radio system to another (cross-patching)
- Transmitting on multiple channels at the same time (multicasting)
- Feeding audio into the wireline fire station alerting system
- Allowing the dispatcher to set independent volume for each channel
- Ability to monitor multiple channels simultaneously
- Decoding of unit IDs and emergency signals

The strength of this system is the capability to control so many radios and repeaters from a single computer at each dispatch position, and also the ability to link different equipment together that might otherwise not be compatible. In this case, it allows legacy General Electric (now MACOM) equipment to work with Motorola equipment of various vintages from the late '70s to those obtained in the last three years.

Centracom cards

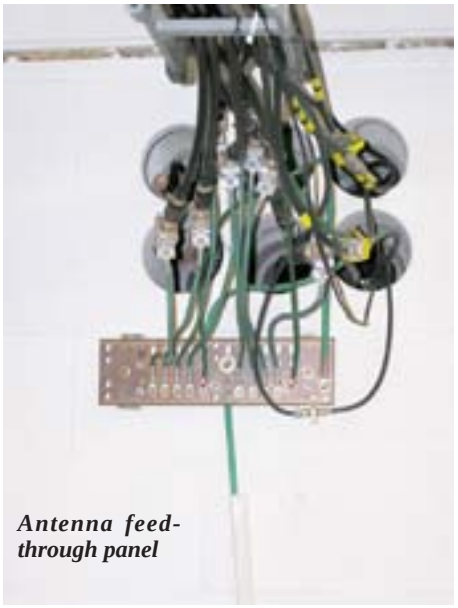
The system configuration shown in figure 1 shows the arrangement of the police department's side of the system. By looking at the configuration, you can see there is a large number of lines (both audio and control) to switch. Also, the system includes the capability to send audio directly from the dispatcher's console to the repeater and override the received audio from the receivers in the repeater system. This is useful in "stuck mike" situations, and also in cases where malicious interference is present. Where accidental or intentional interference occurs, the dispatcher can instruct all units to switch channels until the interference is cleared up.

Another important function of the system is to decode unit IDs and emergency signals

Voting Comparator

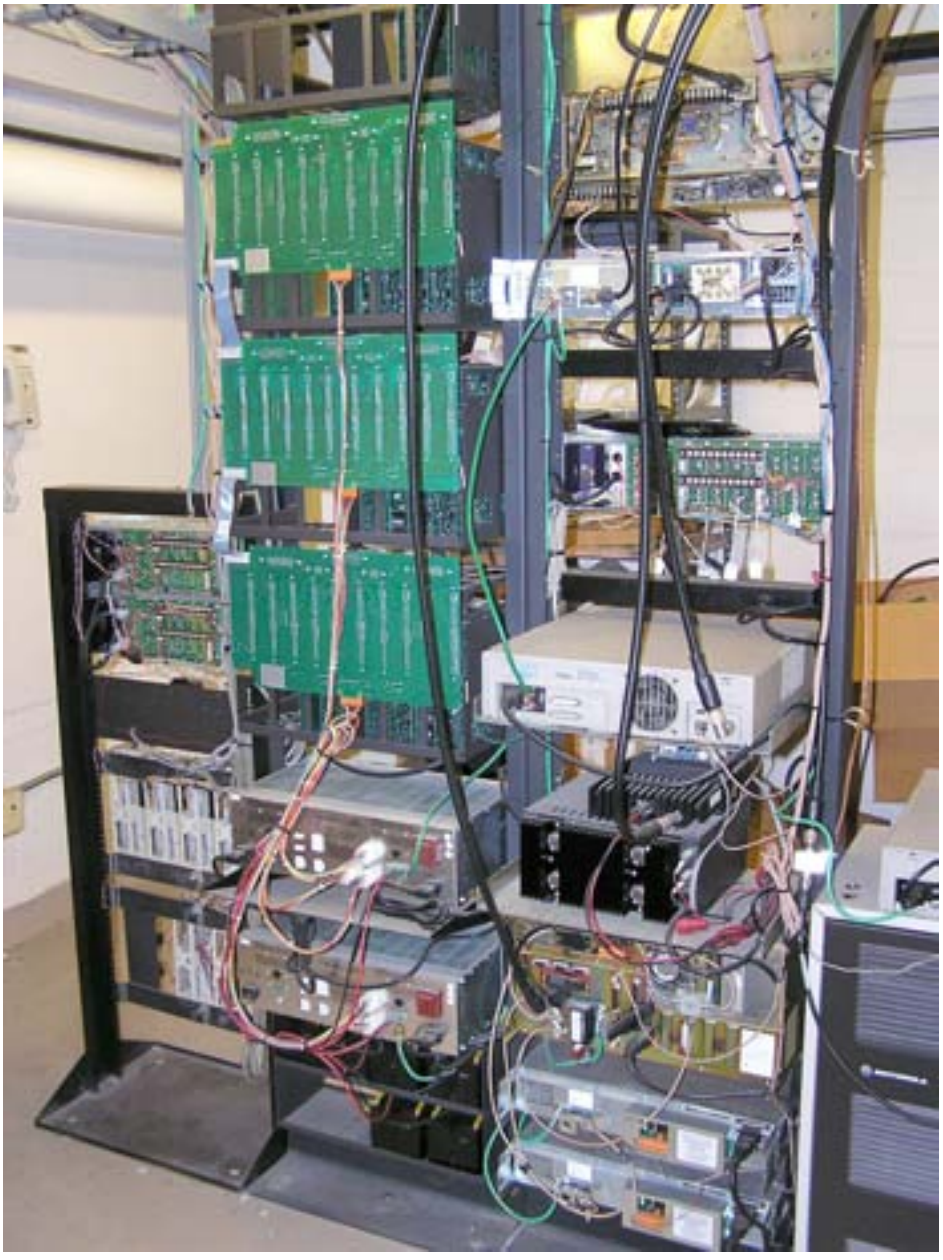
Micor repeater

TIS Station



Antenna feed-through panel

Quantar



from individual police officer and firefighter radios. In a typical system, each radio (in either a vehicle or hand held) is assigned a number that is transmitted each time the push to talk switch is pressed. This allows the dispatcher to see the last unit transmitting. In addition, if the officer or firefighter presses the emergency button on the radio it activates a alarm signal on the dispatcher panel and displays the unit's ID. This works even if the user cannot talk. It is a critical link for officer or firefighter protection.

Now I know some of you are asking, are there any 'real' radios in the PSAP? The simple answer is yes. We have VHF, UHF and 800 MHz transceivers for monitoring and talking to local towns and to act as back ups in case of a catastrophic failure of the system computers (this has never happened). Also, the dispatchers have a Uniden scanner for other monitoring duties they may select during a particular incident.

This description is intended to be a simplified description. I have left some technical details vague or simplified to make the description more generic to the multiple types of systems fielded around the country.

Thanks to Chief Dennis Mannix of the Natick Police Department for permission to take the photos of the Town of Natick system in this article.

The Illinois StarCom21 Statewide System

By Rich Carlson

The Illinois StarCom21 system is a statewide APCO-25 compliant trunked radio system owned and operated by Motorola. The system is designed to give mobile coverage just about anywhere in Illinois, while some areas will also have portable coverage by using Simulcast sites. These simulcast sites are located in the Chicago, Rockford and Peoria metro areas.

There are 141 SmartZone sites using almost 200 radio towers. Ten different simulcast tower sets use the same frequencies at each of the several towers within the set. Simulcast sets contain from 3 to 10 individual tower sites.

The system is broken down into three Zones:

North	(Zone 1)
Central	(Zone 2)
South	(Zone 3)

When a scanner listener monitors the system using a Pro96, Pro2096, BCD396T, BCD996T, PSR500 or PSR600 scanner, the tower number will be displayed along with the System ID of "140." Site Numbers listed in Table 1 are in Decimal, as shown directly on Uniden scanners, and in Hex, as used by Radio Shack and GRE scanners. Pro96 and Pro2096 scanners display these numbers in a modified Hex format.

The GRE PSR-500 and PSR-600 scanners display the "Region" (1, 2, or 3 on StarCom21 sites) and then the 2-digit Hex site number. This Region number corresponds with the Zone numbers used here. Sites are listed with the nearest city or postal name and the county the tower is located in. Since the system is still in a state of flux, these sites can and will change.

See Table 1 for a list of radio towers, their tower numbers, location's GPS data and frequencies.

See Table 2 for a Master Talkgroup list.

All scanners that are capable of monitoring StarCom21 use "Control Channel Only" trunking, so only the currently active Control Channel need be programmed. Occasionally the control channels will change, so it is a good idea to program each of the channels for your local sites, unless you are certain which are the control channels.

The Pro96, Pro2096, BCD296 and BCD796 scanners will only track the 800 MHz sites, while the BCD396T, BCD996T, PSR500 and PSR600 scanners can monitor both the 700 and 800 MHz sites.

The system is still being tweaked, and changes in tower locations, frequencies, and talkgroups used remain to be made. Please see the **RadioReference.com** StarCom21 database and the CARMA Profile (**www.carmachicago.com/profiles**) for the most up-to-date information. RadioReference and CARMA are cooperating by sharing information on this dynamic system as well as others, so both websites should remain up to date..

The approximate GPS coordinates for each of the tower sites are also listed in Table 1. These are helpful for owners of the Uniden BCD996T scanner, as this radio is capable of using these coordinates to automatically turn on and off the sites as the user arrives in an area. For users of ARC996 and UASD programming software, these coordinates are already included in the programming files, which are also available at the CARMA website. In addition, the same site holds a map folio for DeLorme's StreetAtlas program that has the system towers plotted. This will help users decide what towers to monitor for their area.

Illinois State Police

The Illinois State Police has been using a mixture of VHF lowband and Highband frequencies for decades. Originally, all posts used 42.50 MHz for all communications, and later used 42.66 as a mobile talk-back frequency. Eventually, each District was assigned its own base 42 MHz frequency. Some posts used this frequency in simplex mode and others used a separate mobile channel for talkback. 42.50 became the statewide "LF-2," used for car to car, post to post, itinerant traffic and weather alerts. "LF-1" was the label for the various District Dispatch channels.

In the 1970s, many ISP posts were assigned VHF Highband channels to be used in conjunction with the low band dispatch channels. Not all posts were assigned high-band operations channels, but each did get 155.460 ("HF-4"), which was used for many of the same purposes as 42.50. In addition, 154.680 was used as "ISPERN" (Illinois State Police Emergency Radio Network), and most county and local police departments received mobile radios with ISPERN paid for by state and federal grants.

ISPERN was changed to 155.475 after that was designated a nationwide police mutual aid channel. 154.680 was then reassigned as a regular District Operations channel for several districts throughout the state.

There are two ISP Districts with more extensive radio operations. These are District Chicago and District 15. District Chicago was formed after Districts 3 and 4 were merged into a single District. This now covers all of Cook County, including the Chicago area expressways.

A pair of 10 channel EDACS trunked systems were used for the operations of this District until replaced by StarCom21 in September 2007. Before the EDACS system, Districts 3 and 4 each had two Low Band channels and a High Band channel for operations.

District 15 covers the Illinois Tollways. These four Tollways are owned and operated by a special agency of the state government, and police protection is provided by a separate State Police District (District 15). Before StarCom21, District 15 and the Tollway Maintenance department had an extensive 800 MHz linear repeater system with multiple frequencies simulcasting from strategically placed towers along the four tollways. Prior to the old 800 MHz system, a 453 MHz UHF system operated in a similar fashion. Both the Tollway 800 MHz and District Chicago EDACS systems channels have been reassigned to various StarCom21 sites.

During the late summer of 2007, each State Police district moved operations to StarCom21, a process that was completed in September 2007. Most low band operations ended, and the equipment has been or will be removed. High-band radios will be retained as a back-up to StarCom21.

Weather Alert functions have been moved to 155.475 (ISPERN) and other resources. The last users of the ISP low band channels appear to be a few scattered truck weigh stations.

As the largest user of the StarCom21 system, the State Police has made a large investment in it. As a Partner User of the system, they have traded tower sites, radio channel licensing, and other considerations in order to reduce the airtime and equipment costs to the State for the system. While the StarCom21 system is almost identical in technology to the Michigan MPSCS system, StarCom21 infrastructure is owned and operated by Motorola, while MPSCS is owned directly by the State of Michigan. While that reduces the fees for users of MPSCS, there is a huge investment in infrastructure costs.

With the StarCom21 system, those infrastructure costs and maintenance of the system are borne by Motorola, and Motorola negotiates a user fee with potential users. Most non-State users will be paying about $53 per radio per month for airtime, although this is negotiable with Motorola if the user has resources that can be used by the system, such as radio channels or tower space. Users must purchase their own mobile and/or portable radios.

Each Illinois State Police (ISP) District has two or three Dispatch and Detail talkgroups, as well as Car to Car, Investigations talkgroups, and Mobile Extender channels assigned. District Chicago will have additional talkgroups assigned to cover the Cook County area expressways and the various

state law enforcement agencies they dispatch, such as Secretary of State's (SOS) Police, Department of Natural Resources (DNR) Police, and the Illinois Commerce Commission (ICC) Police. Some of these agencies will be assigned specific talkgroups for law and non-law operations.

Many ISP vehicles have Mobile Extenders installed that operate on discrete 700 MHz channels. These allow troopers to use their StarCom21 portable in either Mobile Extender mode or directly on the system. There are also assigned low power tactical channels assigned for various at-scene situations.

The Illinois Tollway Authority has both the Police (District 15) operations and maintenance operations on StarCom21.

In addition to State users, several counties have started to use the system. St. Clair County (near St. Louis) actually owns the site's 359 facilities in St. Clair County. This subsystem is fully compatible with StarCom21, and there is some roaming between St. Clair County and StarCom21 operations.

Neighboring Madison County is using the StarCom21 system for day-to-day activity, as well as McLean County and several of the communities within McLean County. McHenry County is in the process of building a system similar to St. Clair County. Boone County and Belvidere PD have started using StarCom21, and several other counties throughout Illinois have either discussed it or have actually tested use of the system.

Champaign County also has a 9600 baud APCO-25 trunked system using the same technology as StarCom21, called MDICE (MetCad Digital Interoperable Communications Environment). While not interconnected with StarCom21 as St. Clair County is, it does allow users of the MDICE system to have StarCom21 mutual aid talkgroups programmed into the radios.

In addition to the local and State operations, there are numerous Mutual Aid and Incident Response talkgroups. Through various grants, StarCom21 radios have been distributed to many local and county Police, Fire, EMS and EMA agencies, as well as colleges, universities and hospitals. These radios and talkgroups may be used for a wide variety of incidents and drills, such as for tornados, floods, terrorism, or other events that require large-scale responses from a variety of agencies.

Counties and Other Users

Zone 1 (North) Sites:

Site # *Dec (Hex)*	City	County	N. Lat	W. Long	Freqs
101A (101)	Lisle	DuPage	41.8092	-88.0528	***DuPage Simulcast*** **774.28125, 774.53125, 774.78125,** 774.03125, 775.03125, 775.28125, 775.53125, 775.78125
101B	Addison	DuPage	41.9228	-88.0386	
101C	Lemont	DuPage	41.7053	-87.9747	
102A (102)	Westchester	Cook	41.8533	-87.9178	***South Cook County Simulcast*** WPTZ798 **774.34375, 774.59375, 774.84375,** 774.09375, 775.09375, 775.34375, 775.58375, 775.84375
102B	Chicago	Cook	41.8386	-87.7022	
102C	Chicago	Cook	41.6925	-87.6031	
102D	Justice	Cook	41.7414	-87.8328	
102E	Alsip	Cook	41.6644	-87.7414	
102F	Orland Park	Cook	41.5881	-87.8639	
102G	Markham	Cook	41.5903	-87.6803	
102H	Chicago Hts	Cook	41.4964	-87.6392	
102I	Chicago Hts	Cook	41.5069	-87.5556	
102J	Burnham	Cook	41.6342	-87.5588	
103 (103)	Andover	Henry	41.2869	-90.2897	***867.96250, 868.48750,*** *867.43750, 858.21250,*
104 (104)	Ashkum	Iroquois	40.8833	-87.9706	***866.33750, 866.86250***, *866.43750, 868.32500*
105 (105)	Ashton	Lee	41.8533	-89.2261	***774.28125, 774.83125***, *774.03125*
106 (106)	Albany	Whiteside	41.7355	-90.1606	***774.33125, 775.34375***
107 (107)	E. Moline	Rock Island	41.4853	-90.4279	**866.93750, 867.46250, 867.98750,** 866.41250, *868.87500,*
108A (108)	Deerfield	Lake	42.1625	-87.8751	***Lake County Simulcast*** WQDB976 **855.23750,** 866.46250, **867.46250, 867.93750,** 868.98750
108B	Zion	Lake	42.4934	-87.8704	
108C	Sylvan Lake	Lake	42.2383	-88.0619	
108D	Fox Lake	Lake	42.4097	-88.1253	
108E	Gurnee	Lake	42.3825	-87.9475	
108F	Libertyville	Lake	42.3128	-87.9042	
108G	Highland Pk	Lake	42.1854	-87.8037	
109 (109)	Joy	Mercer	41.1975	-90.9011	***867.88750***, *866.83750, 867.36250, 868.41250, 868.98750*
110 (10A) WPTZ798	Melvin-Sibley	Ford	40.5581	-88.3558	**774.28125, 774.53125,** 774.03125
111A (10B)	Rockford	Winnebago	42.2728	-88.9625	***Rockford Simulcast*** **866.41250, 867.38750, 868.38750,** 868.88750, 867.7125
111B	Rockford	Winnebago	42.3232	-88.9987	
111C	Rockford	Winnebago	42.2906	-89.1642	
111D	Rockford	Winnebago	42.2281	-89.0197	
112 (10C) WQDB999	Belvidere	Boone	42.2339	-88.8525	***867.07500, 868.33750, 868.51250, 868.81250,*** *866.88750*
113A (10D)	Elwood	Will	41.3938	-88.0981	***Will County Simulcast*** **774.30625, 774.55625, 774.80625,** 774.05625, 775.05625, 775.55625
113B	Romeoville	Will	41.5822	-88.0825	
113C	Monee	Will	41.4133	-87.7675	
113D	Mokena	Will	41.5037	-87.8849	
113E	Joliet	Will	41.5405	-88.0356	
113F	Braidwood	Will	41.2889	-88.2171	
113G	Crete	Will	41.3875	-87.5618	
113H	Lockport	Will	41.6247	-88.0042	
114 (10E) WQDC308	Providence	Bureau	41.2845	-89.5943	**868.36250, 868.93750,** 867.83750. 857.48750
115A (10F)	Schaumburg	Cook	42.0572	-88.0308	***North Cook County Simulcast*** **854.98750, 866.43750, 866.93750,** 856.23750, 867.88750, 868.46250, 868.91250
115B	Chicago	Cook	41.9763	-87.9031	
115C	Des Plaines	Cook	42.0603	-87.8642	
115D	Chicago	Cook	41.9679	-87.8069	
115E	Chicago	Cook	41.8686	-87.6411	
115F	Chicago	Cook	41.9399	-87.6886	
115G	Skokie	Cook	42.0323	-87.7865	
115H	Elgin	Kane	42.0653	-88.2608	
116 (110)	Bradley	Kankakee	41.1514	-87.8556	***866.41250, 867.91250***, *868.88750*
117 (111)	Kewanee	Henry	41.2747	-89.9717	***774.78125, 775.30625, 775.55625,*** 774.34375, 775.09375,
118 (112)	Illinois City	Rock Island	41.3875	-90.9253	***866.95000, 867.47500,*** *866.42500, 868.88750*
119 (113)	Mt. Carroll	Carroll	42.0822	-89.9003	**867.86250**, *867.33750, 868.98750*
120A (114)	Woodstock	McHenry	42.2951	-88.4301	***McHenry Co Simulcast*** ***(State License)*** WQDB992 **867.41250, 868.43750, 867.91250,** 855.98750 866.96250 ***(McHenry Co. Lic.):*** *866.3500, 866.7375*
120B	McHenry	McHenry	42.3517	-88.3131	
120C	Harvard	McHenry	42.4799	-88.5929	
120D	Crystal Lake	McHenry	42.2433	-88.3133	
120E	Union	McHenry	42.2234	-88.5506	
120F	Hartland Twp	McHenry	42.4111	-88.4806	

120G	Hampshire ***(Share w/126C)***	McHenry	42.1472	-88.5125	*867.5500, 868.0375, 868.3125*
121 (115)	Lena	Stephenson	42.3836	-89.7769	**867.88750, *868.41250***, *867.36250, 868.43750*
122 (116)	Rock Island	Rock Island	41.4651	-90.5758	**867.32500, 867.85000, 868.37500,** *866.48750, 868.95000*
123 (117)	E. Moline	Rock Island	41.5364	-90.4186	***867.87500, 868.40000, 868.97500,*** *867.35000*
124 (118)	Forreston	Ogle	42.1344	-89.5828	856.21250, **857.21250**, *858.21250,* **859.21250**
125 (119) WQAZ301	Morris	Grundy	41.2860	-88.4304	***867.07500,* 867.38750, *868.96250***, *866.88750*
126A (11A)	Aurora	Kane	41.7964	-88.3097	***Kane County Simulcast*** WQDB993 **855.73750, 856.73750, 856.98750,** 855.48750, 868.41250, 868.93750
126B	Plato Center	Kane	41.9894	-88.4667	
126C	Hampshire	McHenry	42.1472	-88.5125	
126D	Elburn	Kane	41.8658	-88.4281	
127 (11B)	Moline	Rock Island	41.4978	-90.4779	**866.88750, 867.41250, 867.93750,** *866.36250, 868.46250*
128 (11C)	Moline	Rock Island	41.4551	-90.5016	***774.81875, 775.30625, 775.56875,*** *775.33125*
129 (11D)	Bonfield	Kankakee	41.1611	-88.0547	***775.33125, 775.59375, 775.83125***
130 (11E)	Grant Park	Kankakee	41.2428	-87.6067	***868.43750, 868.98750***, *855.71250, 867.41250*
131 (11F) WQCZ742	LaSalle	LaSalle	41.3630	-89.0986	**866.95000, 867.47500,** *866.42500, 866.90000, 868.31250, 868.88750*
132 (120)	Ogle Co	Ogle	42.0247	-89.3422	**860.21250, 867.92500, 868.45000**, 866.35000, 860.71250
133 (121)	Ohio	Bureau	41.5597	-89.4706	***774.53125, 775.28125, 775.53125***
134 (122) WQCZ741	Ottawa	LaSalle	41.3578	-88.8317	**866.83750, 867.36250,** *866.31250, 868.98750*
135 (123) WQDB973	Pecatonica	Winnebago	42.2867	-89.3581	**866.16250, 868.06250,** *866.46250, 867.46250*
136 (124) WPTZ798	Rochelle	Ogle	41.9025	-88.9614	**774.56875, 775.08125**, **775.30625,** 774.33125, *775.33125, 775.58125,*
137 (125)	Savanna	Carroll	42.1297	-90.1397	***774.55625, 774.33125***
138 (126)	E. Dubuque	JoDaviess	42.4764	-90.6175	*866.40000, 866.92500, 867.45000, 868.86250*
139 (127)	Galena	JoDaviess	42.4324	-90.3527	*866.37500, 866.90000, 867.42500, 867.95000, 868.47500*
140 (128)	Sterling	Whiteside	41.8061	-89.6589	**866.98750**, *867.82500, 868.35000, 868.92500*
141 (129)	Stockton	JoDaviess	42.3797	-89.9967	***867.83750***, *867.31250, 868.36250, 868.93750*
142 (12A) WPTZ798	Streator	LaSalle	41.1219	-88.7731	**774.79375, 775.54375** 774.08125, *774.83125, 774.33125, 774.58125,*
143 (12B) WQDB964	Beloit	Winnebago	42.4458	-88.9925	**868.96250, 866.57500, 868.48750,** 866.86250, 866.10000, *867.86250,*
144 (12C)	Morrison	Whiteside	41.8739	-90.0219	866.43750, **866.96250, 867.48750,** *868.90000*
145 (12D)	Victoria	Knox	40.9097	-90.1656	**866.87500, 867.40000,** *857.21250, 866.35000,*

Zone 2 (Center) Sites:

Site # *Dec (Hex)*	City	County	N. Lat	W. Long	Freqs
201 (201) WQBC730	Argenta	Macon	39.9535	-88.8647	**866.83750,** 867.36250, 867.88750, 866.31250, *868.41250, 868.98750*
202 (202) WQCW249 KNNK867	Leroy	Mclean	40.4239	-88.7361	**866.87500, 867.40000**, 858.93750, 859.93750, *860.76250,* 866.35000, *867.92500, 868.45000*
203 (203) WQBU918 WQBV729	Champaign	Champaign	40.1111	-88.2431	**866.93750, 867.46250**, 854.96250, 866.41250, 867.98750
204 (204) WQBY659	Danville	Vermilion	40.1614	-87.6951	**859.26250**, **867.82500**, **868.35000**, 866.46250, *867.83750, 867.86250, 868.92500*
205 (205)	East Lynn	Vermilion	40.4739	-87.8108	**867.33750, *867.86250,*** *855.71250, 866.81250,*
206 (206)	Pesotum	Champaign	39.9075	-88.2825	**860.26250**, ***867.41250, 867.93750***, *857.23750, 866.36250, 868.46250*
207 (207) WQCW207	Pontiac	Livingston	40.8693	-88.6415	**867.32500**, **867.85000,** 866.48750, **866.96250,** *867.48750*
208 (208)	Paris	Edgar	39.5522	-87.7001	**867.32500, *868.37500, 868.95000,*** *856.98750, 857.26250, 857.98750, 858.98750, 859.98750, 860.98750*
209 (209)	Bluff Springs	Cass	40.0122	-90.2742	***775.28125, 775.53125***
210 (20A)	Niota	Hancock	40.6072	-91.2728	***866.90000***, *866.37500, 867.42500, 867.95000, 868.47500*
211 (20B)	Augusta	Hancock	40.2258	-90.8994	***866.93750***, *866.41250, 867.46250, 867.98750, 868.87500*
212 (20C)	Fowler	Adams	39.8389	-91.3413	***866.87500***, *866.35000, 867.40000, 867.92500, 868.45000*
213 (20D)	New Canton	Pike	39.6014	-91.0442	***866.83750, 867.36250***, *867.88750, 868.41250, 868.98750*
214 (20E) WQCE891	Lincoln	Logan	40.1204	-89.3907	**866.90000**, *866.37500, 867.42500, 867.95000, 868.47500, 866.33750*
215 (20F)	Mt. Sterling	Brown	39.9636	-90.7572	***866.38750, 866.91250***, *867.43750, 867.96250, 868.48750*
216 (210) WPTZ798	Metamora	Woodford	40.7722	-89.4422	**775.04375, 775.31875, 775.81875,** 774.29375
217 (211)	Springfield	Sangamon	39.6892	-89.6408	**866.92500, *867.45000, 867.97500,*** *866.40000, 868.86250*
218 (212)	Kingston	Adams	39.8078	-91.0153	***866.98750***, *866.46250, 867.81250*
219 (213)	Pittsfield	Pike	39.6056	-90.8297	***866.81250, 867.33750***, *867.86250, 868.38750, 868.96250*
220 (214) 220 (Cont.)	Farmington	Fulton	40.7111	-90.0347	***774.03125, 774.28125, 774.31875, 774.05625, 775.06875***
221 (215)	Monmouth	Warren	40.8997	-90.6086	***867.82500, 868.35000***, *855.51250, 868.92500*
222 (216)	Ellisville	Fulton	40.5791	-90.2757	***867.38750***, *866.86250, 867.91250, 868.43750*
223 (217)	Havana	Fulton	40.4228	-89.8929	***866.47500, 867.31250***, *856.21250, 860.21250, 867.83750*
224 (218)	Macomb	McDonough	40.4786	-90.6742	***866.96250,*** *866.43750, 867.48750, 868.32500, 868.90000*
225 (219)	Warsaw	Hancock	40.3469	-91.4057	***867.35000,*** *866.82500, 868.40000, 868.90000, 868.97500*
226 (21A)	Lakewood	Shelby	39.3019	-88.9369	***866.82500, 867.35000***, *867.87500, 868.40000, 868.97500*
227 (21B)	Taylorville	Christian	39.5172	-89.2272	**867.90000, *868.42500,*** *857.21250, 860.21250, 867.37500,*
228 (21C)	Decatur	Macon	39.8714	-88.9508	**855.21250, 866.86250, 867.38750,** 866.33750
229 (21D) WQCX408	Normal	Mclean	40.5081	-88.9881	**868.40000, 868.97500,** *856.76250,* 857.76250, 858.76250, 859.76250, 860.93750, 867.87500,

KNNK867					
230 (21E) WQCE619	Springfield	Sangamon	39.7994	-89.6453	***867.32500, 867.85000, 868.37500,*** *858.21250, 866.48750,*
231 (21F) WQCT761 KNNK867	Congerville	Mclean	40.6447	-89.1797	**866.85000, 867.37500, 867.90000**, *858.23750, 859.23750, 860.23750, 866.32500, 868.42500*
232 (220)	Atterberry	Menard	40.0694	-89.8669	***866.95000, 867.47500,*** *866.42500, 868.31250,*
233 (221)	Mendon	Adams	40.1101	-91.2899	***866.85000***, *866.32500, 867.37500, 867.90000, 868.42500, 868.42500*
234 (222)	Mattoon	Coles	39.4901	-88.3494	**866.91250, 867.43750, 867.96250,** *858.73750, 858.86250, 859.73750, 860.73750, 866.38750, 868.48750*
235 (223)	Pleasant Hill	Pike	39.4769	-90.9094	***866.86250***, *866.33750, 867.38750, 867.91250, 868.43750*
236 (224) WQBV728	Decatur	Macon	39.8097	-88.9919	**866.96250, 867.48750**, *866.43750, 868.32500, 868.90000*
237A (225)	Peoria	Peoria	40.7297	-89.5548	***Peoria Simulcast***
237B	Mossville	Peoria	40.8144	-89.5699	***867.45000, 867.97500***, *859.21250, 866.92500, 868.86250*
237C	Richwood	Peoria	40.7599	-89.5956	
237D	Peoria	Peoria	40.7408	-89.6737	
237E	Peoria	Peoria	40.6988	-89.6167	
237F	Peoria	Peoria	40.8040	-89.6322	
238 (226)	Jacksonville	Morgan	39.6664	-90.3414	***866.88750, 867.41250, 867.93750***, *866.36250, 868.46250*
Champaign MDICE	Champaign	Champaign	40.1111	-88.2431	**867.56250, 868.13750, 868.53500, 868.82500** 866.06250, 866.55000, 866.80000, 867.20000

Zone 3 (South) Sites:

Site # *Dec (Hex)*	City	County	N. Lat	W. Long	Freqs
301 (301)	Fayetteville	St. Clair	38.4319	-89.8117	***774.34375, 774.56875, 775.28125,*** *775.53125, 775.78125, 774.03125*
302 (302)	Lawrenceville (Sumner)	Lawrence	38.6167	-87.9017	***866.38750***, ***866.91250***, *868.48750*
303 (303)	Beal Woods	Wabash	38.3542	-87.8356	***867.37500, 867.90000,*** *866.85000*
304 (304)	Big Muddy (Ina)	Jefferson	38.1281	-88.9056	**866.95000, 867.47500, 868.31250,** *866.42500, 868.88750*
305 (305)	Belleville	St. Clair	38.5572	-90.0155	***866.86250, 867.38750, 867.91250,*** *866.33750,*
306 (306)	Brussells	Calhoun	38.9553	-90.5886	***867.87500,*** *855.51250, 867.35000, 868.40000*
307 (307) WQCD312	Beaver Dam	Macoupin	39.2161	-89.9833	***866.37500,*** **866.90000**, *859.21250, 866.48750, 867.32500, 867.42500*
308 (308)	Carmi	White	38.0822	-88.2047	**866.87500, *867.40000, 867.92500***, *866.35000, 868.45000*
309 (309)	Flatrock	Crawford	38.8877	-87.6841	***866.88750, 867.41250***, *866.36250, 867.93750, 868.46250, 867.72500*
310 (30A)	Chester	Randolph	37.9531	-89.8769	**866.85000, *867.37500, 867.90000,*** *866.32500, 868.42500*
311 (30B)	Lawrenceville	Lawrence	38.6861	-87.6908	***867.87500, 868.40000***, *858.21250, 868.97500*
312 (30C)	Mt. Olive	Macoupin	39.0352	-89.6963	**775.53125,** *774.33125, 774.58125, 775.03125, 775.29375, 774.03125, 775.84375*
313 (30D)	Newton	Jasper	38.9641	-88.2064	***866.33750,*** **866.86250,** ***867.38750, 867.91250***, *868.43750*
314 (30E)	Centralia	Marion	38.5702	-89.1615	***774.53125, 774.30625, 774.55625, 774.80625,*** *774.05625*
315 (30F)	Cobden	Union	37.5711	-89.1833	**867.33750, 855.21250, 867.86250,** *855.71250,* 866.81250,
316 (310)	Cora	Jackson	37.8611	-89.6283	***866.35000,*** **866.87500**, *867.40000, 867.92500, 868.45000*
317 (311)	Cypress	Johnson	37.3447	-88.9917	866.46250, **866.98750, 867.82500, 868.92500**
318 (312)	DuQuoin	Perry	37.9847	-89.2347	**867.43750, 867.96250,** 866.91250,
319 (313)	Herod	Pope	37.5825	-88.4756	**867.98750, 868.90000,** *856.21250, 867.48750, 868.3250*
320 (314)	Golconda	Pope	37.2254	-88.4961	***866.38750,*** **867.96250**, *868.48750*
321 (315)	Vienna	Johnson	37.4008	-88.7778	***774.55625, 775.33125, 775.58125,*** *775.08125,*
322 (316)	Robinson	Crawford	39.0208	-87.7008	***866.95000, 867.47500***, *866.42500, 868.31250*
323 (317)	E. St. Louis	St. Clair	38.6347	-90.1411	***867.36250, 867.88750, 868.98750,*** *866.83750,*
324 (318) WPTZ798	Nillwood	Macoupin	39.3765	-89.8674	**774.54375, 774.79375, 775.29375,** *774.30625, 775.05625, 775.30625, 775.55625, 775.80625,*
325 (319)	Edwardsville	Madison	38.8075	-90.0058	***774.34375, 774.84375, 775.33125,*** *775.08125, 775.09375, 775.58125, 775.83125*
326 (31A)	Eaton	Crawford	39.0942	-87.8467	**867.33750, *868.38750***, *866.81250, 868.96250*
327 (31B)	Mason	Effingham	38.9778	-88.6239	**867.98750, *868.87500,*** *866.41250, 867.46250*
328 (31C)	Fairfield	Wayne	38.4019	-88.3161	***868.35000, 868.92500,*** *857.21250, 867.82500*
329 (31D)	Carbondale	Jackson	37.6603	-89.2601	**866.86250, 867.38750, *867.91250,*** *866.33750*
330 (31E)	Vandalia	Fayette	38.9453	-89.1028	***866.97500, 867.81250***, *866.45000, 868.33750, 868.91250*
331 (31F)	Mt. Vernon	Jefferson	38.4351	-88.9533	**866.92500, *867.45000, 867.97500***, *866.40000, 868.86250*
332 (320) WQDC439	Gorham	Jackson	37.7156	-89.4851	**867.31250, 867.83750, 868.36250,** *866.47500*
333 (321)	Modoc (Evansville)	Randolph	38.0619	-90.0125	***866.41250, 866.93750, 868.87500,*** *856.21250*
334 (322)	New Roy (Goreville)	Johnson	37.5332	-88.9188	**774.33125,** *774.05625,* **774.80625, 775.08125, *774.58125, 774.83125,*** *774.08125,*
335 (323)	Harrisburg	Saline	37.9081	-88.1436	***775.30625, 774.28125, 774.53125***
336 (324)	Darwin (Marshall)	Clark	39.3217	-87.6214	***860.21250***, ***868.33750, 868.91250,*** *859.48750, 860.93750, 866.45000,*
337 (325)	Karbers Ridge	Hardin	37.5311	-88.2124	**867.83750, 868.93750,** *866.43750, 866.47500, 867.31250*
338 (326)	Gill (Nebo)	Pike	39.3909	-90.7482	***866.96250,*** *866.43750, 867.48750, 868.90000*
339 (327)	Lamb (Cave-In-Rock)	Hardin	37.5311	-88.2124	***866.37500***, **866.90000, *868.47500,*** *866.47500, 867.31250, 867.83750,*
340 (328)	Phillipstown	White	38.1378	-88.0156	***867.32500, 867.85000, 868.37500,*** *866.48750, 868.95000*
341 (329) WQDY915	Unimin (Elco)	Alexander	37.3183	-89.3189	**866.92500, 867.45000,** *866.40000*
342 (32A)	Alexander Co	Alexander	37.3058	-89.4467	**867.95000, 868.47500,** *867.42500*
343 (32B)	Bluford	Jefferson	38.3511	-88.7517	**867.95000, *868.47500,*** *867.42500, 867.45000*
344 (32C) WQDF391	Bald Knob	Union	37.5614	-89.3542	**868.41250, 868.98750, 857.21250,** *867.88750*

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ASK BOB

GENERAL QUESTIONS RELATED TO RADIO

Bob Grove, W8JHD
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Q. *Does anyone still make the flat wire-coil antenna that was on the old vacuum-tube radio backs? Were these type antennas used for short wave? (Joe B., email)*

A. Those old coil-wound backs were for AM; they were actually the RF tuning coil and had just the right number of turns to be resonant-tuned over the 550-1600 kHz range by the variable tuning capacitor. Their large size allowed them to pick up local broadcasters.

For shortwave, you connected a long wire to a back screw typically marked "A" or "ANT" and ran it around the room or out the window to a tree. A "G" or "GND" terminal was connected to a convenient cold-water pipe or even an outdoor ground rod pounded into the soil.

As radios became smaller, those flat back coils were replaced by ferrite rods which acted as signal concentrators as well as resonant tuning coils. I've not seen any of the old backs being made for replacement purposes, but you could search antique radio Internet sites like Antique Radio Classified (ARC).

Q. *My new receiver is being overloaded by a local AM broadcast station on 1540 kHz; its signal level is S9+60 dB. I'm also hearing harmonics almost as strong on (3080, 4620, 6160, 7700 and 9240 kHz). Any suggestions? (Bill McCrea, Latham, NY)*

A. Since the offending spurs are on whole-number multiples of the station's own transmitting frequency, I'd be willing to be that it's their transmitter's fault – that it's actually emitting all those harmonics!

Try this: Attenuate the signal either with the receiver's own function, or with a shorter antenna, so that the fundamental (1540 kHz) signal level is reduced by, say, 20 dB or more. If ALL of the spurious signals are down by about the same amount, it's the transmitter. If the spurs are down significantly more than 20 dB (or whatever amount you attenuated the fundamental), it's probably the receiver. Here are some additional suggestions:

1. Install a notch filter ("suck-out trap") tuned to 1540 kHz and see if the harmonics are still present; and
2. Try another receiver and see if you get the same responses; and
3. Tune in a strong SW signal that is also S9+60 dB and see if the second, third (etc.) harmonics are present.

If a 1540 kHz notch filter removes the harmonics, then the receiver is overloading and producing the spurs; if a second receiver hears the same harmonic frequencies and levels, it's likely the transmitter; if a strong shortwave signal also shows strong harmonics, it's the receiver (although some shortwave stations are noted for radiating their harmonics, especially the third, so once again try hearing these with another receiver to verify).

If it is the receiver, and you want to use a long antenna for shortwave signals, then I'd recommend a preselector ("tuner") which can peak on the signal you want, while attenuating all the rest.

Overload can be expected from S9+60 dB, and some harmonic radiation can be expected close by, but notify the engineer anyway to make sure they are in compliance. If they don't seem to care, the FCC does!

Q. *What is the difference between an antenna tuner and a preselector? Will one or the other reduce electrical noise interference on my shortwave receiver? (Paul Weiss, Phoenixville, PA)*

A. An antenna tuner or transmatch is a device which matches the impedances between your radio (usually a transmitter) and your antenna system in order to minimize transmission-line losses. It is very broadband in the most desirable configuration so that a transmitter can be varied in frequency without having to retune the impedance-matching device.

A preselector is a frequency-adjustable combination of a coil and variable capacitor placed between an antenna and a receiver. Its purpose is to appear passive to the desired signal frequency, but attenuate off-frequency signals to minimize interference from them.

Q. *Even though the frequencies are much lower, does it make sense to use a good quality coax cable opposed to an audio cable as an interlink between a CD player and an amplifier? (E. Sanders, email)*

A. While coax cable does have less loss even at audio frequencies than conventional audio cable, it would be hard to hear the difference except in preposterously long runs! The important considerations are distributed capacitance between the center conductor and shield which attenuate the high frequencies; resistive losses in the insulation, center conductor and shield which reduce efficiency; and percent shielding to prevent the intrusion of external noise like AC hum.

For virtually all practical audio installations, good quality audio cable is adequate, but you can't miss with practical coax like RG-58/U, RG-59/U and RG-6/U with appropriately-installed connectors.

Q. *I often listen to two-way voice communications between the TV frequencies on my AM/FM/TV-sound portable radios. With digital TV replacing analog TV sound in the 700 MHz range, what will I hear there? (Ben-Nye, Westbury, NY)*

A. Not much. Digital TV sound is not receivable on conventional analog receivers or scanners, and the newly-allocated public safety services in the 700 MHz range will be using digital audio as well. Your only hope is to get a scanner with P-25 demodulation capability; this will be the dominant public safety mode to ensure interoperability among licensees.

Q. *Would a metal wok lid make a good dish antenna? If so, can I find the focal point with a flashlight beam pointed inward and reflecting back on a piece of paper? (Ben Nye, Garden City, NY)*

A. Yes and yes, with certain limitations. The wok lid is a circular section and won't have the sharp focus that a parabolic shape would have. But the pickup antenna has some girth to it, so it's not all that critical. Keep in mind that the small size of the dish confines its application to microwave frequencies; it won't make a good shortwave antenna at all! Similar satellite TV dishes operate at 12 GHz.

Questions or tips sent to Ask Bob, c/o MT are printed in this column as space permits. Mail your questions along with a self-addressed stamped envelope in care of MT, or e-mail to bobgrove@monitoringtimes.com. (Please include your name and address.)

Ken Reitz, KS4ZR
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Tuning in to the Other Satellite Radio

We live in an on-demand world. Of course, there's usually a price tag for such a concept, but it's one that has worked really well for cable-TV, whose latest excitement is providing video-on-demand: nearly every movie made available whenever you want to watch it. All you have to do is pay the ever increasing monthly fee.

The same is true for satellite radio. In fact, XM Satellite Radio's motto is "Everything All the Time." That pretty much sums up the concept. The problem is that "everything" costs you $13.99/month and that "everything" means 90% of the channels you're paying for you'll never listen to. It's the same for cable-TV: 90% of the channels offered you probably don't watch and 90% of the movies offered you don't watch, either.

As this is written, the proposed merger between Sirius and XM is still pending and there's some hope that a combined enterprise would include *a la carte* programming, selecting the channels you want for a reduced monthly fee. It's an option that's always been available to cable and satellite TV companies, but neither has exercised that option. Likewise, I hold out little hope that satellite radio will either. Even if they do, I predict it will be less than a year before the first of many price hikes brings us back to where we are now.

Even though the government tells us each month that there is no inflation, the unseemly rise of cable and satellite TV rates over the last 20 years has driven many former cable and satellite customers to consider alternatives such as watching off-air TV and signing up for Netflix or similar monthly movie services that allow you to choose only what you want to watch at a much lower monthly fee than the questionable value of what's on cable. Using this method, even popular cable-TV series such as *The Sopranos* will eventually be available if you don't mind waiting.

❖ DIY Satellite Radio

For years I've been promoting what I call "alternative satellite radio" – national and international radio programming that's delivered via satellite and received on inexpensive small dishes using generic DVB MPEG2 Free-To-Air (FTA) receivers and without any related fee. Originally this was done via the big dish, but within the last five years enough programming has shown up on various Ku-band satellites that it's become worthwhile for those seeking an alternative to tune in. The big drawback for many people is that the programming formats available are limited. So far, only a handful of such broadcasters are up and transmitting. But, recent developments may signal a change.

One of those changes is an Internet radio network feed that's now available on the Galaxy 25 MPEG2 satellite. It's called "Access-America" and has an interesting programming line-up, especially for satellite and radio enthusiasts. The programming goes 24/7 and includes *The FTA Satellite Show*, which updates listeners on the latest programming found on MPEG2 Free-To-Air (FTA) satellite channels; *The Shortwave Report* with Dan Roberts updates listeners on the latest shortwave action and plays parts of actual broadcasts of interest; *This Week in Amateur Radio*, a popular weekly digest of ham radio activities which is often heard on local repeaters; *The Computer Show*, which gives geeks their cyber-fix; and other tech-related shows. In between these shows you'll hear jazz, folk, gospel and more.

Another network feed that airs on the same satellite (Galaxy 25) is called "Contact Radio." A seemingly endless list of chat-show hosts are found here. Details on who's on when can be found at their web site which is listed below.

A channel with which most *MT* readers are already familiar is World Radio Network, also on Galaxy 25, which re-broadcasts many of the top shows of the big international shortwave broadcasters. Programming from more than 20 countries is heard on their 24/7 schedule, as well as Glenn Hauser's *World of Radio*, which airs at 08:30 Z on Sundays and again at 17:30 Z on Saturdays and Sundays.

Anyone with an interest in Old Time Radio (OTR) will enjoy every minute of the 24/7 programming from Yesterday U.S.A. Radio Network on Galaxy 11. Bill Bragg's indefatigable spirit continues to drive this all-volunteer, listener supported OTR network as he has done for more than 25 years. OTR "DJs" present 90 minute programs of their favorites, which include many shows not available anywhere else. Each of YUSA's presenters are experts in the OTR programming field and include Frank Bresee (the voice of "Little Beaver" on the old *Red Rider* radio series), who plays many outstanding interviews he's done over the decades with many OTR stars; country music legend Ronnie Milsap and many more, who delve deep into their own treasuries of OTR programs each week.

Another program of note is Tony Fournier's *Vintage Group Harmony Show*, during which he plays obscure groups recorded on long-gone record labels from the '40s, '50s and '60s. It's music you can't hear anywhere else (including Sirius or XM). And, if that isn't obscure enough for you, listen to the *Music Museum* where two old guys (Milt Larsen and David Berger) play 78s from the Teens and '20s. They get a little corny sometimes, but they know their stuff and anyone interested in the earliest days of recorded music won't mind.

❖ How You Can Get Started

If you look at the chart on the next page, you'll notice that, while many satellite radio signals are found on one satellite (Galaxy 25), there are at least two others that would nice to be able to access. There are five ways you can set up to tune in.

Old Fashioned Big Dish

If you have a functioning 10-ft dish with a C/Ku-band feed, all you have to do is add FTA receiver capability and you can tune in from satellite to satellite. All the equipment necessary for adding Ku-band to your current C-band dish and a line-up of MPEG2 FTA receivers is found at **www.skyvision.com**. To add FTA capability to your existing big dish set-up, simply feed the LNB to the loop-through on the FTA receiver and back into your big dish receiver. Feed the output of the FTA receiver into your DVD or VCR recorder. Feed the audio output from the FTA receiver into your stereo.

Now, not only can you watch either your current C-band analog programs (or 4DTV digital if you have one), you can also watch MPEG2 FTA programs on your TV set, and you can even record through the DVD or VCR recorder.

Stand-alone Ku-band Dish

If you only want the programming from one satellite, say Galaxy 25, all you need is a single Ku-band dish with Ku-band LNBF set up on G25. Complete Ku-band receivers with dish and LNBF are sold for under $200. Check out the offerings at Skyvision or the links on the FTA Show. The advantage of this set-up is that it's very easy to install, has no moving parts, and is essentially trouble-free.

I still like the Ku-band system sold by Globecast, because not only does it do all the things other FTA systems do, but it has a built-in smart card that lets you subscribe to the encrypted channels on G25 offered by Globecast World TV (including Setanta Sports USA which broadcasts EUFA cup football, among others). Call Globecast at 888-988-5288 to order your system or subscribe to programming.

There are many other companies that sell stand-alone Ku-band systems; among them are

WHAT'S ON ALTERNATIVE SATELLITE RADIO

Access America
(Galaxy 25, 97°W) transponder 23
www.access-america.net
www.access-america.net/listen.m3u

Contact Radio
(Galaxy 25)
www.contactradio.info
http://64.27.20.6:2693/listen.pls

Globecast World TV
(Galaxy 25)
www.globecastwtv.com/EN/home_America.php

The Micro Effect
(Galaxy 25)
www.themicroeffect.com
www.themicroeffect.com/listenlive.htm

WCPE-FM
(AMC1,103°W)
www.wcpe.org
http://theclassicalstation.org/internet.shtml

World Radio Network:
(Galaxy 25)
http://new.wrn.org/listeners/stations/station.php?StationID=50

Yesterday U.S.A. Radio
(Galaxy 11, 91°W)
www.yesterdayusa.com
www.yesterdayusa.com/streams.htm

Sadoun (**www.sadoun.com**) and long-time C-band dealer Tom Taylor, who runs Taylor Enterprises (**www.mpeg2fta.com**) and has much valuable information about MPEG2 FTA on his website.

Multi-Dish Feed System

This is the system I use. By setting up several Ku-band dishes and linking them with a special switching connector, you can easily tune from one satellite to the other using the software in your MPEG2 FTA receiver. It's much simpler than it sounds. Over the years I've collected an odd assortment of Ku-band dishes and one year I decided to line them up and connect them via what's called a DiSEqC switch that takes the input of up to four satellite feeds and connects them to one MPEG2 receiver. The receiver's software tells your receiver which satellite feed to use when changing programs.

I have one dish pointed at WCPE, one pointed at Yesterday U.S.A., and one pointed at Galaxy 5. By setting up the on-screen program guide, I can use the remote control to flip from channel to channel (and satellite to satellite) seamlessly. It's a little tricky setting up the receiver and programming the channels you want to turn to, but once you've done it a few times it's like anything else – you'll wonder why you waited so long to do it.

The only problem with this method is that it takes up a fair amount of real estate. A simpler way is to use a multi-feed, single dish system.

Multi-Feed Dish System

This system is the opposite of the one above. It utilizes only one dish and mounts several feed horns on the dish in such a way that the dish can "see" several satellites at once. This is not a new concept. It's been done for decades at cable-TV head-ends and both DBS satellite services use as many as three LNBFs on one dish for their programming. Application of this concept for the non-commercial home dish market is relatively new.

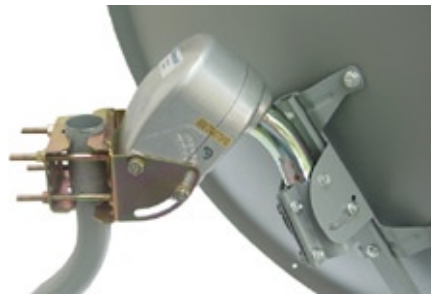
Multi-feed satellite systems from Global Communications offers several ways to put several feed horns on one dish. (Courtesy: Global Communications)

Global Communications (**www.global-cm.net**) has everything you could possibly want to know about these systems on their web site, including details on how these systems work, how many satellites you can reasonably expect to get from one dish, and more. They sell all the bits of hardware from dishes to mounts and LNBFs. They also have a complete line-up of FTA receivers and big dishes, too. You can catch their informative satellite TV show on Access-America.

If you're a little inventive, you can do the same thing yourself. Bits of aluminum, hose clamps from the hardware store, LNBFs from the mail order satellite TV companies and plenty of time to experiment is all you need.

Small Dish Drive System

This system lets you use one satellite and one LNBF to scan the skies just like the big dishes. The little motor can power a 1 meter steel dish through 95 degrees of arc. The command signal, power for dish and LNBF and downlink signals are all sent via the same coax. The PM900 from Pansat is available from Global Communications for $89 plus shipping. It's a simple solution to the multi-satellite problem but requires careful set-up.



This Pansat PM900 motor controls a small dish and has a built-in switch that can change satellites when you change channels. (Courtesy: Global Communications)

❖ Time to Pay

All of these alternative satellite radio sources cost money to operate. I hope that if you find yourself listening to any of these sources for any amount of time you'll consider sending a donation. They all tell you just how you can do it on-line and on the air. So, instead of paying big bucks each month to a Fortune 500 company, send a little something to the people who really entertain you and do it from their hearts.

Larry Van Horn, N5FPW
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Monitoring the World of Weather

Over the years I have worked in the radio hobby, many things can send radio hobbyist to the dials for extended monitoring periods. Disasters, Space Shuttle launches, and major military events will get a radio monitor's blood stirred up and cause one to hit the dials looking for the action. But nothing quite tops monitoring weather events. Weather junkies and radio really do go hand and hand.

One of the major sources of weather information available to the public is broadcast by the National Oceanographic and Atmospheric Administration (NOAA). The NOAA All Hazards Weather Radio is a network of radio stations broadcasting continuous weather information directly from a nearby National Weather Service (NWS) office. It is operated by the National Weather Service (NWS), an agency of NOAA within the United States Department of Commerce. NOAA weather radio broadcasts National Weather Service warnings, watches, forecasts and other hazard information 24 hours a day.

It also broadcasts alerts of non-weather emergencies, such as national security, natural, environmental, and public safety (e.g., AMBER Alerts) through the Federal Communications Commission's (FCC) Emergency Alert System.

Known as the "Voice of NOAA's National Weather Service," NOAA Weather Radio includes more than 985 transmitters, covering all 50 states, adjacent coastal waters, Puerto Rico, the U.S. Virgin Islands, and the U.S. Pacific Territories. NWR requires a special radio receiver or scanner capable of picking up the signal. Broadcasts are found in the VHF public service band at these seven frequencies (MHz):

162.400 162.425 162.450 162.475
162.500 162.525 162.550 MHz

❖ Streaming NOAA Weather on the Net

There are two types of NOAA Weather Radio All Hazards audio available on the Internet:

- Live Streaming Audio
- Audio Files for Download or Online Listening

Some selected NOAA Weather Radio All Hazards broadcasts are available online as live streaming audio (see Table One). These streams are hosted by third parties such as universities, private companies and individuals, not by NWS. You can find the portals and other resources with links to these broadcasts in our *GlobalNet* resources Guide). While they broadcast the audio used by these streams, the National Weather Service has no control over interruptions or discontinuation of these streaming audio services. Many of these streams are hosted by the Weather Underground.

Some of these streams have a limit to the number of simultaneous connections they can support. If there is active weather in a particular area, you may not be able to connect to the audio stream from that area.

These audio streams do require an audio player. There are several free players available on the Internet (see our *GlobalNet* Audio Software Resource Guide). If your audio player doesn't seem to work with a stream, you may need to use a different player. Some of the links may not work with every Internet browser (e.g., Firefox, Internet Explorer). If your browser doesn't work, try another.

❖ Amateur Radio and Weather Information

Another place to get up-to-date, real time weather information is from amateur radio repeaters. Many locations around the country have weather spotting nets, and hams are always talking about the weather at their locations.

In the May issue of *MT*, *GlobalNet* covered all of the various amateur services streaming audio over the net, including Echolink. During hurricane conditions, the National Hurricane Center has a node set up on Echolink for the relay of real time weather information. You can learn more about Echolink from the link in the *GlobalNet* Resource Guide.

❖ Audio Site for Weather Junkies

If you are a real weather junkie, you might want to stop by the Weather Audio Broadcast Network (see resource guide). The WABN website was developed by Jim Williams in late 1998. Jim is also the editor and creator of Hurricanecity (see resource guide). He felt continuous coverage of hurricanes making landfall would inform and entertain listeners as well as allow visitors to interact with the broadcast by calling on their toll free number posted during live shows. They now cover all major weather events.

Williams, the host of the broadcast, handles

most of the technical detail and broadcasting. Barbara Williams (Jim's wife) also helps on audio with commercials and updates. Bill Phillips in Virginia Beach, Virginia, and Mark Davis in Batavia, Illinois, also take over severe weather coverage when their surrounding areas are affected. The network also has approximately 150 observers nationwide and in the Caribbean who provide information on severe weather via telephone (provided communications are still up).

Major weather events, such as hurricanes making landfall, tornadoes that hit major metro areas with many fatalities, and crippling snow storms in major metropolitan areas (usually over 12 inches accumulation in less than 24 hrs) are broadcast via WABN. Broadcasts will also take place for a major earthquake or other natural disasters which affect tens of thousands of people. When live broadcasts are not being streamed, you will hear their looping 24 hour a day broadcast consisting of documentaries, weather facts and music with a live cam shot of their studios in Delray Beach, Florida.

Well, that about does it for this month. We hope during this period of stormy weather that you all will stay safe and out of harm's way. So until next time, good hunting on the *GlobalNet*.

NOAA Weather True Audio Streaming Locations

State	City	Callsign	Frequency (MHz)
AL	Birmingham	KIH54	162.550
AL	Florence	KIH57	162.475
AR	Little Rock	WXJ55	162.550
AR	Springdale	WNG694	162.400
AZ	Nogales	WNG703	162.500
AZ	Safford	KXI24	162.550
AZ	Tucson	WXL30	162.400
CA	Bakersfield	WXL89	162.550
CA	Coachella	KIG78	162.400
CA	El Paso Mountains	WNG659	162.425
CA	Eureka	KEC82	162.400
CA	Fresno	KIH62	162.400
CA	Sacramento	KEC57	162.550

CA	San Diego	KEC62	162.400
CA	Santa Ana	WWG21	162.450
CA	Victorville	WXM66	162.500
CO	Denver	KEC76	162.550
CO	Fort Collins/Ault	WXM92	162.450
CO	Greeley	WXM50	162.400
CO	Glenwood Springs	WWG43	162.500
CO	Mead/Longmont	WXM51	162.475
CT	Hartford	WXJ41	162.475
CT	New London	KHB47	162.550
FL	Daytona Beach	KIH26	162.400
FL	Fort Myers	WXK83	162.475
FL	Fort Pierce	WWF69	162.475
FL	Jacksonville	KHB39	162.550
FL	Largo	KEC38	162.450
FL	Melbourne	WXJ70	162.550
FL	Miami	KHB34	162.550
FL	Orlando	KIH63	162.475
FL	Palatka	WNG522	162.425
FL	Sarasota	WWG59	162.400
FL	Tallahassee	KIH24	162.400
FL	Tampa Bay	KHB32	162.550
FL	West Palm Beach	KEC50	162.475
GA	Atlanta	KEC80	162.550
GA	Augusta	WXK54	162.550
GA	Clayton	KXI81	162.450
GA	Jesup	WXJ28	162.450
IA	Mason City	KXI68	162.450
IA	Waterloo	WXL94	162.550
IL	Champaign	WXJ76	162.550
IL	Chicago	KWO39	162.550
IL	Crystal Lake	KXI41	162.500
IL	DeKalb	WNG536	162.550
IL	Hillsboro	KXI79	162.425
IL	Kankakee	KZZ58	162.525
IL	Lockport	KZZ81	162.425
IL	Marion	WXM49	162.425
IL	Odell	WXK24	162.450
IL	Peoria	WXJ71	162.475
IL	Plano (Yorkville)	KXI58	162.400
IL	Quad Cities	WXJ73	162.550
IL	Salem	KXI49	162.475
IL	Springfield	WXJ75	162.400
IN	Evansville	KIG76	162.550
IN	Fort Wayne	WXJ58	162.550
IN	Indianapolis	KEC74	162.550
IN	New Albany	KIH43	162.475
IN	Seymour	WWG73	162.525
IN	South Bend	WXJ57	162.400
KS	Wichita	KEC59	162.550
KY	Covington	KIH42	162.550
LA	Monroe	WXJ96	162.550
MA	Boston	KHB35	162.475
MB	Winnipeg	XLM538	162.550
MI	Adrian/Petersburg	WNG647	162.450
MI	Detroit	KEC63	162.550
MI	Escanaba	KZZ35	162.500
MI	Flint	KIH29	162.475
MI	Grand Rapids	KIG63	162.550
MI	Traverse City	KIH22	162.400
MI	West Olive	WXN99	162.425
MI	Wolf Lake	WNG672	162.425
MN	Appleton	KXI32	162.550
MN	Minneapolis/ Saint Paul	KEC65	162.550
MN	Norwood	WNG685	162.425
MN	Park Rapids	WWG98	162.475
MN	Thief River Falls	WXK43	162.550
MO	Fredericktown	WWG49	162.500
MO	Hannibal	WXK82	162.475
MO	Jamestown	KWN55	162.425
MO	Kansas City	KID77	162.550
MO	La Plata	WXM39	162.525
MO	Saint Louis	KDO89	162.550
MS	Booneville	KIH53	162.400
MT	Billings	WXL27	162.550
MT	Glasgow	WXL32	162.400
NC	Chapel Hill	WXL58	162.550
NC	Fayetteville	WXL50	162.475
NC	Garner	WNG706	162.450
NC	Henderson	WNG586	162.500
NC	Wilmington	KHB31	162.550
NE	Grand Island	WXL74	162.400
NE	Lincoln	WXM20	162.475
NE	Omaha	KIH61	162.400
NH	Holderness	WNG545	162.550
NH	Mount Washington	KZZ41	162.500
NJ	Atlantic City	KHB38	162.400
NM	Carlsbad	WWF37	162.475
NY	Buffalo	KEB98	162.550
NY	Elmira	WXM31	162.400
NY	New York City	KWO35	162.550
NY	Riverhead	WXM80	162.475
NY	Rochester	KHA53	162.400
OH	Akron	KDO94	162.400
OH	Columbus	KIG86	162.550
OH	Dayton	WXJ46	162.475
OH	Mansfield	WWG57	162.450
OH	Toledo	WXL51	162.550
OK	Bartlesville	WNG644	162.425
OK	Broken Bow	WXJ65	162.450
OK	Clinton	WXK87	162.525
OK	Oklahoma City	WXK85	162.400
OK	Tulsa	KIH27	162.550
ON	Collingwood	XMJ316	162.475
OR	Medford	WXL85	162.400
OR	Portland	KIG98	162.550
PA	Allentown	WXL39	162.400
PA	Erie	KEC58	162.400
PA	Johnstown	WXM33	162.400
PA	Philadelphia	KIH28	162.475
PA	Pittsburgh	KIH35	162.550
PR	San Juan	WXJ69	162.400
RI	Providence	WXJ39	162.400
SC	Columbia	WXJ20	162.400
SC	Greenville	WXJ21	162.550
SD	Lead (Spearfish)	WXL23	162.525
SD	Rapid City	WXM63	162.550
SD	Sioux Falls	WXM28	162.400
TN	Bristol	WXK47	162.550
TN	Lawrenceburg	WWF84	162.425
TN	Memphis	WXK49	162.475
TX	Abilene	WXK29	162.400
TX	Austin	WXK27	162.400
TX	Corpus Christi	KHB41	162.550
TX	Corsicana	KXI87	162.525
TX	Dallas	KEC56	162.400
TX	Del Rio	WXJ98	162.400
TX	Houston	KGG68	162.400
TX	Lubbock	WXK79	162.400
TX	San Antonio	WXK67	162.550
UT	Salt Lake City	KEC78	162.550
VA	Covesville	KZZ28	162.450
VA	Manassas	KHB36	162.550
VA	Norfolk	KHB37	162.550
VA	Roanoke	WXL60	162.475
VT	Burlington	KIG60	162.400
WA	Capitol Peak (Olympia)	WXM62	162.475
WA	Seattle	KHB60	162.550
WA	Spokane	WXL86	162.400
WI	Baraboo	KHA47	162.450
WI	Green Bay	KIG65	162.550
WI	Madison	WXJ87	162.550
WI	Milwaukee	KEC60	162.400
WI	Prairie Du Chien	WWG86	162.500
WI	Rhinelander	WNG565	162.400
WI	Wausaukee	WNG553	162.400
WV	Beckley	WXM71	162.550
WY	Cheyenne	WXM37	162.550

Disclaimer: The audio streams from the stations listed above and available on various portals are provided by external companies, citizens, or universities. The audio streaming links listed in the Resource Guide will take you to external web pages away from NOAA's National Weather Service website. The listing of these audio streams does not constitute an endorsement by the NWS of any information, products or services by the content provider. The NWS does not own or operate these sites and is not responsible for site maintenance or data accuracy. Use this data and the audio streams at your own risk.

GLOBALNET RESOURCE GUIDE

Echolink - **www.echolink.org/**
Environmental Canada Weatheradio - **www.msc.ec.gc.ca/msb/weatheradio/**
Hurricanecity - **www.hurricanecity.com/**
Interactive Non-Streaming Audio MP3/Podcast - **www.roanokevalleyweather.com/noaawxradio/noaawxradio.php#mp3**
National Weather Service Streaming Audio - **www.nws.noaa.gov/nwr/streamaudio.htm**
NOAA Weather Radio All Hazards - **www.nws.noaa.gov/nwr/**
Weather Audio Broadcast Network - **www.weatheraudio.net/**
Weather Radio.info - **www.weatherradio.info/**
Weather Radio Online Audio - Roanoke Valley Weather - **www.roanokevalleyweather.com/noaawxradio/noaawxradio.php**
Weather Underground - **www.wunderground.com/wxradio/index.html**

GlobalNet AUDIO SOFTWARE RESOURCE GUIDE

Icecast Media Player - **www.icecast.org/**
Real Audio Player - **www.real.com/**
Butel Client Software - **www.netcore.us/ezs/eazystream_clientsetup.zip**
Teamspeak - **www.goteamspeak.org/**
Winamp Media Player - **www.winamp.com/**
Windows Media Player - **www.microsoft.com/wmp**

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Open and Closed Scanning

For listeners making the step up from conventional to trunked scanning, understanding the details surrounding talkgroups, scanner modes, voice formats, control channels, and other complexities can be a daunting challenge. This month we address two reader questions involving these kinds of details.

Hi Dan,

Your web page was a great help. Thanks for taking the time to explain. I do have a question in reference to trunk tracking. Just for your information I am using a Radio Shack Pro 95 (along with software and USB cable) for programming.

With my Pro 95 I can just program the Control Channels in my area (Tampa Bay and St. Petersburg, Florida). I am playing with a couple of different channels, attempting to understand the trunking system. In one bank I have the control channels, frequencies and talk groups, and another bank just control channels.

Question: If I list just the control channels and I do not want Public Works, Parks Department, Bus Service, etc., do I enter their talk group and then lock that group out?

I believe when I do that I also have to select CLOSE option using my software versus OPEN mode?

I'm still a little confused in that area.

It almost seems like it would be more efficient if you had to program just the talk groups you want to listen to and not talk groups you do not want to monitor.

If you could shed some light in that area I would appreciate it.

Just taking a stab at being correct: Since when a radio transmits it is assigned a random available frequency, seems like you would have to list the talk groups you do not want to hear and lock them out. Wouldn't doing tags for all the other talk groups just be identifying the agency using it?

Thanks,

Ron in Florida

The PRO-95 scanner, introduced in late 2002, is capable of scanning Motorola and EDACS trunked radio systems, as well as conventional frequencies. It cannot scan Logic Trunked Radio (LTR) systems, nor can it monitor digital voice traffic from APCO Project 25 networks. It has ten storage banks, each capable of storing 100 frequencies.

The PRO-95 also has ten talkgroup identifier (ID) banks, each of which has five sub-banks. Each of these sub-banks has 20 ID locations. This means you can store up to 100 talkgroup IDs in each bank, for a total of 1,000 possible talkgroup IDs in the scanner. Each of these IDs can also have an associated "text tag" that is displayed when the talkgroup is active.

When the scanner stops on a transmission in the Motorola (or EDACS) mode, it checks to see if the talkgroup identifier has been stored. If the scanner is in the "Closed" mode, the scanner only stops on the transmission and displays the text tag if the talkgroup identifier is stored and is not locked out. If the scanner is in the "Open" mode, the scanner always stops on a transmission and will also display the associated text tag if you have stored the talkgroup identifier.

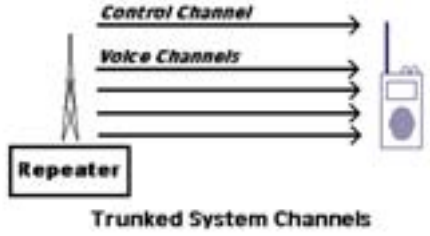
So, if you have a specific list of talkgroup identifiers you want to monitor and don't care about any other possible conversations, program those identifiers into your scanner and run the bank in "Closed" mode. You do not need to program identifiers that you don't want to monitor.

The instructions for storing talkgroups can be found starting on page 62 in the Owner's Manual. If those seem too brief or confusing, you might try reading an "Easier to Read PRO-95 Manual" on the World Wide Web at **http://myweb.cableone.net/marksscanners/95/95.html**

❖ Control Channel Only

The PRO-95, along with many other scanners, offers a feature that eases the programming burden for Motorola trunked systems. A "Control Channel Only" (CCO) mode allows the scanner to automatically tune to the proper frequency during a talkgroup conversation.

Without the CCO feature, you must program each possible voice frequency into your scanner. For example, if the system uses 20 frequencies, you would have to program all 20 frequencies into a bank for scanning. With CCO, you only need to program the frequencies



used for control channel signaling. By decoding the information carried on the control channel, the scanner can figure out the actual voice frequency in use and tune to it directly.

Recall that a Motorola trunked radio system has two kinds of channels. The first kind are voice channels, which make up the majority of the frequencies used by the system and actually carry the audio portion of each conversation. The second kind are control channels, which continuously transmit information about all of the conversations taking place on the system. There is usually only one control channel active at any particular time, although many systems alternate control channel frequencies on a regular basis in order to spread the wear and tear across multiple transmitters.

❖ Pinellas County, Florida

St. Petersburg is a city of about 250,000 located in Pinellas County, Florida. It is on a peninsula between the Gulf of Mexico and Tampa Bay and boasts 360 days of sunshine each year. Pinellas County operates a Motorola Type II trunked radio system that carries voice traffic in both analog and APCO-25 digital formats. The PRO-95 will track the activity on this system just fine, but will not be able to monitor any transmission in which the voice format is digital.

The control channels in use on this system are:

857.2375, 858.2375, 859.2375, 860.2375, 860.7125, 866.1625 and 866.3000 MHz.

If you'd rather enter all of the voice and control channel frequencies, here they are:

856.2125, 856.2375, 856.7125, 856.4625, 856.7375, 856.9375, 856.9625, 857.2125, 857.2375, 857.4625, 857.7125, 857.7375, 857.9375, 857.9625, 858.2125, 858.2375, 858.4625, 858.7125, 858.7375, 858.9375, 858.9625, 859.2125, 859.2375, 859.4625, 859.7125, 859.7375, 859.9375, 859.9625, 860.2125, 860.2375, 860.4625, 860.7125, 860.7375, 860.9375, 860.9625, 866.0875, 866.1625, 866.3000, 866.3375, 866.5375, 866.5875, 866.8500, 866.9000, 867.0875, 867.3625, 867.6000, 867.8375, 868.1625, 868.4125, 868.6625 and 868.9125 MHz.

Talkgroups on the Pinellas County system include:

Decimal	Hex	Description
3712	0E8	Clearwater Government Complex
4000	0FA	County Emergency Operations Center (Channel A)
4032	0FC	County Emergency Operations Center (Channel B)

4064	0FE	County Emergency Operations Center (Channel C)
4096	100	County Emergency Operations Center (Channel D)
4128	102	County Emergency Operations Center (Channel E)
4320	10E	Countywide
4352	110	Countywide
7520	1D6	Law Enforcement Training (Channel 1)
7552	1D8	Law Enforcement Training (Channel 2)
14624	392	St. Petersburg/Clearwater Airport Operations
14656	394	St. Petersburg/Clearwater Airport Operations
14688	396	St. Petersburg/Clearwater Airport Operations
14720	398	St. Petersburg/Clearwater Airport Operations
16480	406	Law Enforcement 1
16512	408	Law Enforcement 2
16544	40A	Law Enforcement 3
16576	40C	Law Enforcement 4
16640	410	Special Events 1
16672	412	Special Events 2
16704	414	Special Events 3
16736	416	Special Events 4
17440	442	Department of Children and Families (Channel A)
17472	444	Department of Children and Families (Channel B)
17504	446	Department of Children and Families (Channel C)
17536	448	Department of Children and Families (Channel D)
17568	44A	Department of Children and Families (Channel E)
19680	4CE	St. Petersburg Police (South Dispatch)
19712	4D0	St. Petersburg Police (North Dispatch)
19744	4D2	St. Petersburg Police (West Dispatch)
19776	4D4	St. Petersburg Police (Car-to-Car)
19808	4D6	St. Petersburg Police (Information 1)
19840	4D8	St. Petersburg Police (Information 2)
19872	4DA	St. Petersburg Police (Events 1)
19904	4DC	St. Petersburg Police (Events 2)
19936	4DE	St. Petersburg Police (Events 3)
19968	4E0	St. Petersburg Police (Events 4)
20000	4E2	St. Petersburg Police (Events 5)
20032	4E4	St. Petersburg Police (Events 6)
20064	4E6	St. Petersburg Police (Events 7)
20192	4EE	St. Petersburg Police (Tactical 1)
20224	4F0	St. Petersburg Police (Tactical 2)
20256	4F2	St. Petersburg Police (Tactical 3)
20288	4F4	St. Petersburg Police (Undercover Operations)
20384	4FA	St. Petersburg Police (Undercover Operations)
20448	4FE	St. Petersburg Police (Narcotics)
20576	506	St. Petersburg Police (Intelligence)
20640	50A	St. Petersburg Police (Detectives)
20800	514	States Attorney (Channel 1)
20832	516	States Attorney (Channel 2)
20864	518	States Attorney (Channel 3)
20896	51A	States Attorney (Channel 4)
33152	818	Public Works (Channel 1A)
33184	81A	Public Works (Channel 1B)
33216	81C	Public Works (Channel 1C)
33248	81E	Public Works (Channel 1D)
33280	820	Public Works (Channel 1E)
33312	822	Public Works (Channel 2A)
33344	824	Public Works (Channel 2B)
33376	826	Public Works (Channel 2C)
33408	828	Public Works (Channel 2D)
33440	82A	Public Works (Channel 2E)
33472	82C	Public Works (Solid Waste)
33504	82E	Public Works (Solid Waste)
33632	836	Public Works (Engineering)
33664	838	Public Works (Operations)
33696	83A	Public Works (Surveillance Teams)
33728	83C	Public Works (Conservation)
33792	840	Traffic Engineering
33824	842	Traffic Engineering
33856	844	Traffic Engineering
33952	84A	Public Works (Highway)
33984	84C	Public Works (Highway)
34016	84E	Public Works (Highway)
34080	852	Mosquito Control (Channel A)
34112	854	Mosquito Control (Channel B)
35392	8A4	Animal Control (Channel A)
35424	8A6	Animal Control (Channel B)
36576	8EE	Election Office (Channel A)
36608	8F0	Election Office (Channel B)
36640	8F2	Election Office (Channel C)
36672	8F4	Election Office (Channel D)
36864	900	County Fire 1A (Dispatch)
36896	902	County Fire 1B (Tactical North)
36928	904	County Fire 1C
36960	906	County Fire 1D (Tactical Overflow)
36992	908	County Fire 1E (Tactical Mid Primary)
37024	90A	County Fire 1F (Tactical Mid Secondary)
37056	90C	County Fire 1G (Tactical South Primary)
37088	90E	County Fire 1H (Tactical South Secondary)
37120	910	County Fire 1I (Tactical South Secondary)
37152	912	County Fire 1J
37184	914	County Fire 1K (Administration)
37216	916	County Fire (Low Priority Channel A)
37248	918	County Fire (Low Priority Channel B)
37280	91A	County Fire (Low Priority Channel C: Clearwater)
37312	91C	County Fire (Low Priority Channel D: Largo)
37344	91E	County Fire (Low Priority Channel E)
37376	920	County Fire (Low Priority Channel F)
37408	922	County Fire (Low Priority Channel G: St. Petersburg)
37440	924	County Fire (Low Priority Channel H)
37472	926	County Fire (Low Priority Channel I)
37504	928	County Fire (Low Priority Channel J)
38304	95A	Emergency Medical Service A
38336	95C	Emergency Medical Service B (Dispatch)
38368	95E	Emergency Medical Service C (Dispatch)
38464	964	St. Petersburg Fire A
38496	966	St. Petersburg Fire B
38528	968	St. Petersburg Fire C
38560	96A	St. Petersburg Fire D
38592	96C	St. Petersburg Fire E
38624	96E	St. Petersburg Fire F
38688	972	St. Petersburg Fire G
39040	988	Medical Transport D
39072	98A	Medical Transport E
39104	98C	Medical Transport F
39136	98E	Medical Transport G
39168	990	Medical Transport H
39200	992	Medical Transport I
39232	994	Medical Transport J
39264	996	Medical Transport K
39296	998	Medical Transport L
39328	99A	Medical Transport M
40960	A00	Sheriff Patrol 1 (South Pasadena)
40992	A02	Sheriff Patrol 2 (Maderia Beach, Seminole)
41024	A04	Sheriff Patrol 3 (Dunedin Palm Harbor)
41056	A06	Sheriff Patrol 4 (Oldsmare Safety Harbor)
41088	A08	Sheriff (Supervisor)
41184	A0E	Sheriff Bravo 1 (Car-to-Car)
41216	A10	Sheriff Bravo 2 (Car-to-Car)
41248	A12	Sheriff Bravo 3 (Car-to-Car)
41280	A14	Sheriff Bravo 4 (Car-to-Car)
41440	A1E	Sheriff (Investigative Operations Bureau)
41472	A20	Sheriff Criminal Investigation Division
41504	A22	Sheriff Criminal Investigation Division
41536	A24	Sheriff Civil Service
41568	A26	Sheriff Warrant Service
41600	A28	Sheriff Forensics
41632	A2A	Sheriff Training
41664	A2C	Sheriff Transporter
41696	A2E	Sheriff SWAT
41728	A30	Sheriff SRO
41760	A32	Sheriff Youth Service
41792	A34	Sheriff Operations 1
41824	A36	Sheriff Operations 2 (Marine Patrol)
41952	A3E	Sheriff (Intelligence)
42080	A46	Sheriff Criminal Investigation Division (Dispatch)
42112	A48	Sheriff Criminal Investigation Division (Tactical B)
42144	A4A	Sheriff Criminal Investigation Division (Tactical C)
42176	A4C	Sheriff Criminal Investigation Division (Tactical D)
42208	A4E	Sheriff Criminal Investigation Division (Tactical E)
42240	A50	Sheriff Criminal Investigation Division (Tactical F)
42272	A52	Sheriff Criminal Investigation Division (Tactical G)
45792	B2E	Sheriff SWAT
45984	B3A	Sheriff Undercover Operations

If you have access to the Internet, you might want to check the real-time incident web page at **http://www.pinellascounty.org/911/ActCallsPub.htm**

Pinellas County provides an updated list of emergency calls, assigned equipment, and geographic location markers on a Google Maps display.

❖ VIRGINIA

While I was on vacation recently in Myrtle Beach, I was lucky to find a copy of your magazine. I found it very helpful, especially when it comes to trunked radio systems. I have been an avid listener in my area until a switch was made to an EDACS trunked system. I did purchase another scanner in an attempt to monitor, but it did not go well.

My question is this: I live in Spotsylvania County, Virginia. According to the information I have found, my county's system type is an EDACS Standard and the system voice appears to be Pro Voice and analog. Does this mean I am not able to purchase any scanner to monitor this system? I still can monitor the fire/rescue dispatch channel (156.195 MHz) but I do not understand how this is occurring. Any information that you can provide me would be greatly appreciated.

Sincerely,
Mike in Virginia

Spotsylvania County is located in northeast Virginia, approximately 60 miles south of Washington, D.C. It is home to more than 120,000 residents, many of whom commute to businesses in Northern Virginia and the nation's capitol.

Mike is able to hear the county fire and rescue dispatches due to a *simulcast* setup. Dispatches are simultaneously broadcast on both the VHF frequency of 156.195 and on the county's trunked radio system. Additional conventional frequencies are used by emergency personnel to speak directly with each other without having to work through a repeater. This mode of communication is referred to as "talk-around."

Frequency	Description
156.195	Fire Dispatch (Simulcast from TRS)
866.5125	Talk-Around 1
866.0125	Talk-Around 2
867.0125	Talk-Around 3
867.5125	Talk-Around 4

The county trunked radio system is indeed EDACS (Enhanced Digital Access Communications System), which they migrated to in early 2000. Three years ago the county approved $95,000 to purchase encryption upgrades to 272 radios, 260 of which were from the Sheriff's Department. That's not nearly enough to upgrade everyone, so certainly not all traffic on the system will be encrypted.

What is not clear is how much of the current traffic is analog and how much is ProVoice. Reports from the area indicate that the system carries a mix of both formats, with some talkgroups using ProVoice and some using analog. ProVoice is a proprietary method of delivering speech in a digital format over an EDACS radio channel. It is not compatible with APCO Project 25, although some of the underlying technology is similar.

Any scanner that has EDACS trunking capability can monitor the analog traffic; however, there is no scanner on the market that is able to provide voice traffic from ProVoice transmissions.

Because of the way voice channel frequencies are represented on an EDACS system, each frequency must be entered in the proper scanner memory location according to its associated Logical Channel Number (LCN). For example, LCN 01 should be entered in memory location 1 of a selected bank, LCN 02 in memory location 2, and so on. If the frequencies are not entered in the proper locations, the scanner will not be able to follow conversations correctly.

Frequencies for the Spotsylvania County EDACS system are as follows:

LCN	Frequency
01	856.4875
02	857.4875
03	858.4875
04	859.4875
05	860.4875
06	866.6125
07	867.4000
08	867.6750
09	867.1750
10	867.6250
11	868.1000

Talkgroup identifiers in an EDACS system can be represented as either a single decimal number or as a pair of numbers in what is called Agency-Fleet-Subfleet (AFS) format.

Dec	AFS	Description
17	00-021	County Fire Channel 1 (Dispatch)
18	00-022	County Fire Administration
71	00-087	Disaster Operations
81	00-101	County Fire Channel 2 (Fireground)
82	00-102	County Fire Channel 3 (Fireground)
83	00-103	County Fire Channel 4 (Fireground)
84	00-104	County Fire Channel 5 (Fireground)
85	00-105	County Fire Channel 6 (Fireground)
86	00-106	County Fire Channel 7 (Fireground)
87	00-107	County Fire Channel 8 (Fireground)
88	00-110	County Fire Training 1
89	00-111	County Fire Training 2
273	02-021	Sheriff Patrol 1 (Dispatch)
274	02-022	Sheriff Tactical 1
275	02-023	Sheriff Tactical 2
276	02-024	Sheriff Tactical A
277	02-025	Sheriff Tactical B
278	02-026	Sheriff Tactical C
279	02-027	Sheriff Incident Management
280	02-030	Sheriff Training
281	02-031	Sheriff Search and Rescue
289	02-041	Sheriff Patrol 2 (Dispatch)
290	02-042	Sheriff Tactical 3
291	02-043	Sheriff Tactical 4
305	02-061	Emergency Response Team (ERT)
321	02-081	Narcotics
337	02-101	Detectives
340	02-104	Game Warden
353	02-121	County Court
369	02-141	Sheriff Information
375	02-147	Radio Shop
529	04-021	Building Codes
530	04-022	Environmental Engineering
531	04-023	Code Enforcement
545	04-041	Administration
546	04-042	Public Works
547	04-043	Refuse Disposal
549	04-045	Public Works
550	04-046	Landfill Operations
551	04-047	Public Works
565	04-065	Sewer Crew
566	04-066	Water Crew
567	04-067	Sewer Treatment Plant
569	04-071	Motts Run Water Plant
570	04-072	Utility Repair Crews
573	04-075	Utilities
574	04-076	Utilities
575	04-077	Utilities (Administration)
577	04-081	Animal Control
609	04-121	Parks and Recreation
626	04-142	County Fire (Mutual Aid)
627	04-143	County Fire (Mutual Aid)
628	04-144	County Fire (Mutual Aid)
629	04-145	County Fire (Mutual Aid)
641	05-001	County School Board (Administration)
642	05-002	County School Construction
643	05-003	County School Maintenance
644	05-004	County School Transportation
645	05-005	County School Buses (Channel 1)
646	05-006	County School Buses (Channel 2)
647	05-007	County School Buses (Channel 3)
648	05-010	County School Maintenance
649	05-011	County School Maintenance

That's all for this month. Enjoy these dog days of summer, and when you're inside cooling off, you can send me electronic mail with your questions, comments, and latest frequencies and talkgroups to *dan.veeneman@monitoringtimes.com*. You can also find frequencies, links and other radio-related information on my web site at **www.signalharbor.com**. Until next month, happy scanning!

Big Savings on Radio Scanners

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Bearcat® 796DGV Trunk Tracker IV with free scanner headset

Manufacturers suggested list price $799.95

CEI Special Price $519.95

1,000 Channels • 10 banks • CTCSS/DCS • S Meter

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Frequency Coverage: 25.000-512.000 MHz., 806.000-956.000 MHz. (excluding the cellular & UHF TV band), 1,240.000-1,300.000 MHz.

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Manufacturer suggested list price $299.95

CEI Special Price $169.95

250 Channels • 5 banks • PC Programmable

Size: 7.06" Wide x 6.10" Deep x 2.44" High

Frequency Coverage: 25.0000-54.0000 MHz., 108.0000-174.0000 MHz., 400.0000-512.000 MHz., 806.0000-823.9950 MHz., 849.0125-868.9950 MHz., 894.0125-956.0000 MHz.

The Bearcat BCT8 scanner, licensed by NASCAR, is a superb preprogrammed 800 MHz trunked highway patrol system scanner. Featuring TrunkTracker III, PC Programming, 250 Channels with unique BearTracker warning system to alert you to activity on highway patrol link frequencies. Preprogrammed service searches makes finding interesting active frequencies even easier and include preprogrammed police, fire and emergency medical, news agency, weather, CB band, air band, railroad, marine band and department of transportation service searches. The BCT8 also has preprogrammed highway patrol alert frequencies by state to help you quickly find frequencies likely to be active when you are driving. The BCT8 includes AC adapter, DC power cable, cigarette lighter adapter plug, telescopic antenna, window mount antenna, owner's manual, one year limited Uniden warranty, frequency guide and free mobile mounting bracket. For maximum scanning enjoyment, also order the following optional accessories: External speaker **ESP20** with mounting bracket & 10 feet of cable with plug attached $19.95. Magnetic Mount mobile antenna **ANTMMBNC** for $29.95.

Bearcat® BCD396T Trunk Tracker IV

Suggested list price $799.95/**CEI price $519.95**

APCO 25 9,600 baud compact digital ready handheld TrunkTracker IV scanner featuring Fire Tone Out Paging, Close Call and Dynamically Allocated Channel Memory (up to 6,000 channels), SAME Weather Alert, CTCSS/DCS, Alpha Tagging. Size: 2.40" Wide x 1.22" Deep x 5.35" High

Frequency Coverage:
25.0000-512.0000 MHz., 764.0000-775.9875 MHz., 794.0000-823.9875 MHz., 849.0125-868.8765 MHz., 894.0125-956.000 MHz., 1240.0000 MHz.-1300.0000 MHz.

The handheld BCD396T scanner was designed for National Security/Emergency Preparedness (NS/EP) and homeland security use with new features such as **Fire Tone Out Decoder**. This feature lets you set the BCD396T to alert if your selected two-tone sequential paging tones are received. Ideal for on-call firefighters, emergency response staff and for activating individual scanners used for incident management and population attack warning. **Close Call Radio Frequency Capture** – Bearcat exclusive technology locks onto nearby radio transmissions, even if you haven't programmed anything into your scanner. Useful for intelligence agencies for use at events where you don't have advance notice or knowledge of the radio communications systems and assets you need to intercept. The BCD396T scanner is designed to track Motorola Type I, Type II, Hybrid, SMARTNET, PRIVACY PLUS, LTR and EDACS® analog trunking systems on any band. Now, follow UHF High Band, UHF 800/900 MHz trunked public safety and public service systems just as if conventional two-way communications were used. **Dynamically Allocated Channel Memory** - The BCD396T scanner's memory is organized so that it more closely matches how radio systems actually work. Organize channels any way you want, using Uniden's exclusive dynamic memory management system. 3,000 channels are typical but **over 6,000 channels are possible** depending on the scanner features used. You can also easily determine how much memory you have used and how much memory you have left. **Preprogrammed Systems** - The BCD396T is preprogrammed with over 400 channels covering police, fire and ambulance operations in the 25 most populated counties in the United States, plus the most popular digital systems. **3 AA NiMH or Alkaline battery operation and Charger** – 3 AA battery operation - The BCD396T includes 3 premium 2,300 mAH Nickel Metal Hydride AA batteries to give you the most economical power option available. You may also operate the BCD396D using 3 AA alkaline batteries. Unique Data Skip - Allows your scanner to skip unwanted data transmissions and reduces unwanted birdies. Memory Backup - If the battery completely discharges or if power is disconnected, the frequencies programmed in the BCD396T scanner are retained in memory. Manual Channel Access - Go directly to any channel. LCD Back Light - A blue LCD light remains on when the back light key is pressed. Autolight - Automatically turns the blue LCD backlight on when your scanner stops on a transmission. Battery Save - In manual mode, the BCD396T automatically reduces its power requirements to extend the battery's charge. Attenuator - Reduces the signal strength to help prevent signal overload. The BCD396T also works as a conventional scanner to continuously monitor many radio conversations even though the message is switching frequencies. The BCD396T comes with AC adapter, 3 AA nickel metal hydride batteries, belt clip, flexible rubber antenna, wrist strap, SMA/BNC adapter, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO or ESAS systems. Order on-line at www.usascan.com or call 1-800-USA-SCAN.

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Bearcat BCD396T APCO 25 Digital scanner with Fire Tone Out	$519.95
Bearcat 246T up to 2,500 ch. Trunktracker III handheld scanner	$214.95
Bearcat Sportcat 230 alpha display handheld sports scanner	$184.95
Bearcat 278CLT 100 channel AM/FM/SAME Wx alert scanner	$129.95
Bearcat 248CLT 50 channel base AM/FM/weather alert scanner	$104.95
Bearcat 92XLT 200 channel handheld scanner	$109.95
Bearcat 72XLT 100 channel handheld scanner	$99.95
Bearcat BR330T up to 2,500 ch. Trunktracker III with Tone out	$274.95
Bearcat BCT8 250 channel information mobile scanner	$169.95
Bearcat 350C 50 channel desktop/mobile scanner	$104.95
AOR AR16BQ Wide Band scanner with quick charger	$199.95
AOR AR3000AB Wide Band base/mobile receiver	$1,079.95
AOR AR5000A+3B Wide Band 10 KHz to 3 GHz receiver	$2,599.95
AOR AR8200 Mark IIIB Wide Band handheld scanner	$594.95
AOR AR8600 Mark II Wide Band receiver	$899.95
AOR AR-ONE Government/Export sales only 10 KHz-3 GHz.	$4,489.95
Scancat Gold For Windows Software	$99.95
Scancat Gold for Windows Surveillance Edition	$159.95

Bearcat® BC246T Trunk Tracker III

Suggested list price $399.95/**CEI price $214.95**

Compact professional handheld TrunkTracker III scanner featuring Close Call and Dynamically Allocated Channel Memory (up to 2,500 channels), SAME Weather Alert, CTCSS/DCS, Alpha Tagging. Size: 2.72" Wide x 1.26" Deep x 4.6" High

Frequency Coverage:
25.0000-54.0000 MHz., 108.0000-174.0000 MHz., 216.0000-224.9800 MHz., 400.0000-512.0000 MHz., 806.0000-823.9875 MHz., 849.0125-868.9875 MHz., 894.0125-956.000 MHz., 1240.0000 MHz.-1300.0000 MHz.

The handheld BC246T TrunkTracker scanner has so many features, we recommend you visit our web site at www.usascan.com and download the free owner's manual. Popular features include **Close Call Radio Frequency Capture** – Bearcat exclusive technology locks onto nearby radio transmissions, even if you haven't programmed anything into your scanner. **Dynamically Allocated Channel Memory** - Organize channels any way you want, using Uniden's exclusive dynamic memory management system. 1,600 channels are typical but **over 2,500 channels are possible** depending on the scanner features used. You can also easily determine how much memory is used. **Preprogrammed Service Search (10)** - Makes it easy to find interesting frequencies used by public safety, news media TV broadcast audio, Amateur (ham) radio, CB radio, Family Radio Service, special low power, railroad, aircraft, marine, racing and weather frequencies. **Quick Keys** - allow you to select systems and groups by pressing a single key. **Text Tagging** - Name each system, group, channel, talk group ID, custom search range, and S.A.M.E. group using 16 characters per name. **Memory Backup** - When power is lost or disconnected, your BC246T retains the frequencies that were programmed in memory. **Unique Data Skip** - Allows the BC246T to skip over unwanted data transmissions and birdies. **Attenuator** - You can set the BC246T attenuator to reduce the input strength of strong signals by about 18 dB. **Duplicate Frequency Alert** - Alerts you if you try to enter a duplicate name or frequency already stored in the scanner. **22 Bands** - with aircraft and 800 MHz. The BC246T comes with AC adapter, 2 AA 1,800 mAH nickel metal hydride batteries, belt clip, flexible rubber antenna, wrist strap, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. For more fun, order our optional deluxe racing headset part **#HF24RS** for $29.95. Order now at www.usascan.com or call 1-800-USA-SCAN.

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Everything You Ever Wanted to Know About Cuban "Numbers"

The Cuban "numbers" stations have continued to attract a huge amount of attention. It's probably safe to say that, by now, much of the American public associates these transmissions with short wave radio in general. Recordings of them are still being used in music. At this point, they're practically entertainment.

Keeping track of Cuba's broadcast schedule is a huge undertaking. It might be the largest one of any agency in the world, with hundreds of weekly time slots on dozens of frequencies.

Even the Cubans have a problem staying on top of it all, as demonstrated by the frequent use of the wrong frequencies and modes. You'll often hear "Oops, I goofed" switch-grabbing changes to the right ones. The equipment is also known for bad audio, with low modulation, distortion, hum, and dropouts. Audio programs frequently mix with each other or with recorded broadcasts from Radio Havana.

If anything, numbers transmissions have increased since the incapacitation of Fidel Castro and the closing of the Russian activities at the Lourdes intercept station. Since it's unlikely that Cuba actually has more agents in the field than such global powerhouses as the Israeli Mossad, most listeners assume that a good portion of the messages are dummies. Such a tactic is common, to complicate traffic analysis and generally to make an operation look more formidable than it really is.

Several contributors to radio mailing lists have kept a pretty good watch on this vast operation. One list is maintained by ENIGMA 2000, the online incarnation of the authoritative European Numbers Information Gathering and Monitoring Association. Another is Chris Smolinski's "Spooks." Using these and real-time Internet chat, people with names like Jon-FL, dj, mslaten, westt1us, our well known contributor Tom Sevart, and occasionally yours truly, attempt to keep up with this huge beast.

❖ Cuban Numbers Basics

Let's review what we know. These transmissions are definitely for spies. At least two high-profile busts made by the US government have caught people in the act, complete with schedules and recordings on their laptop computers.

Most of the broadcasts come from transmitting sites outside Havana, including the one near Bauta also used by Radio Havana Cuba for short wave broadcasting. High power and simple modulation are used, most of the time anyway. It's as if they go out of their way to be heard. In fact, they probably do, given the target audience's simple receiving equipment and lack of technical sophistication.

The stations usually operate legally in the fixed service spectrum, though there have been a few cases of interference with other services outside these bands. On a couple of occasions, sources have also been identified outside Cuba, including one ongoing mystery that has repeatedly been triangulated to central Pennsylvania.

All messages are in 5-figure code groups, in which the first group corresponds to one sent in the opening callup. The current format uses three messages of 150 groups each, after a repeated, 3-group callup beginning with the Spanish procedural signal "Atención" (Attention!).

Traditionally, the modes used have been voice and Morse code. The voice, ENIGMA designator V02a, is machine-generated. The equipment or software splices together digitized recordings of a human female saying each individual number plus the Spanish "Atención," "Grupo" (group), and "Finál" (end). The voice changes every so often. Right now there is an "old" and a "new" voice, accompanied by slightly different formatting of the messages.

The Morse code, ENIGMA designator M08a, uses machine-sent "cut" numbers. This is a common practice of substituting letters for some or all of the digits 0 through 9. The letters are much shorter, and this can save a huge amount of time. It's actually quite a bit faster than the same message sent in the machine voice mode.

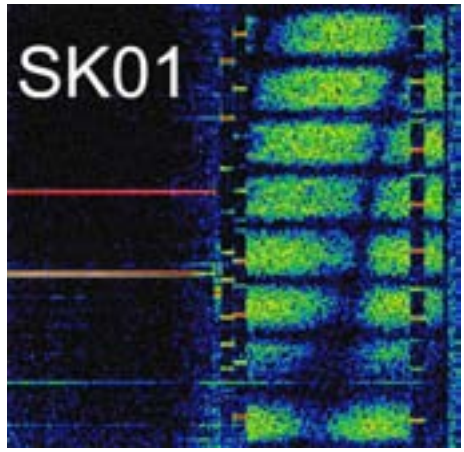
Cuba's letter substitutions are a bit strange. They are ANDUWRIGMT for 1234567890. Some, like A for 1 and T for 0, are standard practice. Others, like N for 2 instead of the usual 9, are just weird. As with the voice, there is an "old" and "new" message format, though the differences are again slight.

Morse transmissions are on-off-keyed, Continuous Wave (CW), or using audio tones in amplitude-modulated (AM) broadcast transmitters. This second emission is usually logged as a type of modulated CW (MCW). The voice is usually also AM, though sometimes the lower sideband is weak or missing, causing it to be logged as upper sideband (USB) emission.

❖ A Switch to Digital?

In the past year, the Cubans have experimented with a number of ham radio digital modes. It was fun to watch them go through the features of what was obviously a shareware Windows ham package called MultiPSK. They pushed various buttons and tried out different types of phase-shift keying (PSK). They finally settled on a fast, error-checking mode called PSK220F.

Given its use of PSK, ENIGMA labeled this new one SK01. It was certainly the first time a legitimate spy organization had tried anything being used mostly by hams. Of course, Cuba almost immediately switched most of its digital transmissions away from PSK. Most are now in a weird mode used more typically for transferring pictures over the ham radio.



Spectrogram of an RDFT SK01 transmission (with a huge selective fade right in the middle). You can hear the actual audio by downloading the mp3 audio file from the MT Readers site.

We've talked about this one before. It's RDFT, for Redundant Digital File Transfer. This is a high-speed, multiple-frequency-shift-keying (MFSK) mode with eight data tones. One can identify it from a distinctive startup sequence of two pilot tones followed by a second or so of the unmodulated data tones, before the hiss starts. At press time, it appears strongly as if additional RDFT schedules are being added.

The software being used is a rather unstable Windows ham freeware called DIGTRX. This stands, presumably, for Digital Transfer. It locked up my computer so often

that I stopped using it. Hopefully, the spies have better luck.

At first, the files being transferred were just text versions of the voice and Morse messages, but more recently they've switched to weird binary files often misdesignated as text but printing as total garbage. These tend to be short, and no one has a clue what kind of code or cipher, if any, is in use.

RDFT doesn't tolerate fading well. Rather than pick a better mode, they've gone to absolutely staggering effective radiated power levels (ERP). The morning (local time) schedule at 1600 Coordinated Universal Time (UTC) is among the loudest signals being heard here in California from anybody. This and the AM mode being used (when USB would be far more efficient) indicate to me that one of the heavy-duty Radio Havana transmitters at the Bauta site has been pressed into service. While there's certainly nothing wrong with the carrier, the baseband audio link is pretty bad, with frequent hum and whine.

It's long been assumed that the machine-sent Morse transmissions are intended to be copied by other machines. They're usually repeated, allowing fills of missed characters, and Morse software has been found on the seized computers. Perhaps these digital broadcasts are an experiment in going to the next step and bypassing manual decryption as well. The user would receive the broadcast, do a couple of steps, and the messages would come up on the screen. After this, the day's virtual code-pad page would (hopefully) be deleted. It seems to be as good a guess as any.

❖ V02a/M08a Traffic Analysis

The large amount of information now available on the Internet has made it possible to do pretty comprehensive analysis of the Cuban transmissions. Most of the time, the only software required is Microsoft Office, or its Linux counterpart.

The previously mentioned listener going by the name of westt1us has done some pretty good work here. He's developed some good insights into the completely weird use of the number 9. While a random encryption system should produce a random output, the digit 9 seems to have some non-random procedural significance, especially in the "new" voice and Morse formats.

The most striking use of the nine is when it is absent. What kind of numbers station would leave out the nine digit altogether? This is one of the strangest behaviors of a very strange organization.

Westt1us has found that when a message has no nines, the first two and last two groups are different. If the message has nines, they are the same. Also, messages with nines repeat the following hour, while those without nines do not.

Westt1us proposed the interesting theory that those messages without nines are dummies. This makes sense, given the lack of repetition. However, wasting a whole transmission on something so easily dismissed by intercepting intelligence organizations makes a whole lot less sense. But sense is something

that one will not commonly encounter when dealing with Cuban numbers. I think he may be onto something here.

The 9 digit also has significance in the initial three-group callup sequences. These frequently used to increment the last digit by one, apparently to indicate a repeated message, but the new formats have gone to something more complicated, based on where nines occur in these groups. A different, simpler, pattern uses ones in the callup, perhaps to indicate non-sequential message repetitions.

❖ Cuban Numbers Schedule

The following table is as close to what Cuba is doing in the middle of 2008 as anything you're going to find anywhere. It pulls together around a thousand hits by different listeners, including myself. Times of day (in UTC) are in rows down the left, while columns are days of the week. A UTC day begins in the evening of the day before in the U.S.

Frequencies are in kilohertz (kHz). As always, they will vary plus or minus one kHz. A few will most likely have changed during the publication lead time. Surely, a few more have still never been discovered due to bad propagation or sleep schedules.

Cuban day/time slots repeat weekly, and an increasing number are daily. Some slots are consistently skipped, so the blank slots here are not due to missing data. For some time now, there has been no operation at 0000, and very little at 1200.

All transmissions start on the hour except SK01 at 1630 on 16178 kHz. Morse code broadcasts (M08a) are shown with a +. Frequencies with partial or complete SK01 use have a *. The rest are voice (V02a).

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
0000							
0100		3389			4028, 8136	5135, 6768	
0200		3292			5417	4028, 5762	
0300	4174, 4800, 5794, 6855	4017+, 4028+, 10125+	4479	10445+		4028+, 10125+	
0400	4035, 5117, 6768+	3292+, 3927+, 11566+	4329, 4479+	11565+	4479, 13380	3292+	
0500	5898+	5898+		5898+	4028, 13380+	5898+	
0600	5800+	5800+	8186+	5800+		5800+	
0700	5883	5883, 6786	9153+	5883, 6786	5883, 9153+	5883	5883, 6786
0800	5898, 8160+, 8186+	5898, 8180*	8186+, 9063+	5898, 8180*	5898, 9063+	5898, 8186	5898
0900	9063+, 10432+	8180*, 9040*	9040+, 9063+	8180*, 9040*	10432+	9040, 9063+, 10432*	10432+
1000	9112+*, 9240	9240*	9240	9240*	9112+	4035, 9112*, 9240	9112+*
1100						4478, 4507+	
1200						9152+	
1300	7519, 8097+	5116	5761+, 8097+	5134+	5134+, 8097+		
1400	6866+, 8097+	5134+	5882+, 8097+	5799+	5416+, 8097+		
1500	4034+, 5771+	4034+, 5771+		4034+, 5771+	5771, 17515	5771+	5771+
1600	17515, 17435*	17515, 17435*	4506+, 17515, 17435*	4506, 6867, 17515, 17435*	17515, 17435*	17515, 17435*	17515, 17435*
1630	16178*	16178*	16178*	16178*	16178*	16178*	16178*
1700	17435	17435	17435	17435	17435	17435	17435
1800	8097+	8097+	8097+	8097+	8097+	8097+	8097+
1900	6785+, 7680+, 8097+	8097+, 12180	6785+, 7680+, 8097+	6785+, 8097+, 12180	6785+, 7680+, 8097+	8097+	8097+
2000	7554+, 7887	7554+, 7887, 13380	7554+, 7680, 7887, 8009+	7554+, 7887, 8097, 13380	7554+, 7887, 8009+	7887	7887
2100	6855, 7974+	6855, 7974+	6855, 6932+	6855, 6932+	6855, 7974+	6855, 7974+	6855, 7974+

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ABBREVIATIONS USED IN THIS COLUMN

AFB ..... Air Force Base
ALE..... Automatic Link Establishment
AM..... Amplitude Modulation
AWACS..... Airborne Warning And Control System
CW..... On-off keyed "Continuous Wave" Morse telegraphy
DEA..... US Drug Enforcement Administration
E07 ..... Russian Intelligence, bizarre machine voice in English
E10 ..... Israeli phonetic alphabet "female" English voice
EAM ..... Emergency Action Message
FAX ..... Radiofacsimile
FEMA..... US Federal Emergency Management Agency
HF-GCS..... High-Frequency Global Communication System
LSB..... Lower Sideband
M01 ..... Unknown agency, 5-number CW groups sent by hand
M08a ..... Cuban 3-msg CW/MCW, ANDUWRIGMT = 1-0
MARS ..... Military Affiliate Radio System
MCW..... Modulated CW, alone or as audio tones
MWARA..... Major World Air Route Area
NASA ..... US National Aeronautics and Space Administration
PR ..... Puerto Rico
PSK ..... Phase-Shift Keying
RDFT ..... Redundant Digital File Transfer, 8-tone PSK
RTTY..... Radio Teletype
Selcal ..... Selective Calling
SHARES ..... SHAred RESources, US government frequency pool
SK01 ..... Generic for Cuban numbers in ham digital modes
UK..... United Kingdom
Unid..... Unidentified
US..... United States
USS..... United States Ship
USAF..... US Air Force
V02a ..... Cuban "Atencion" Spanish numbers, 3-msg format
X06 ..... Russian "Mazielka" tone calling, possible data follow-on elsewhere

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time). "Numbers" stations have their ENIGMA (European Numbers Information Gathering and Monitoring Association) designators in ( ).

3840.0 YHF2-Israeli Intelligence, null-message callup only (E10), at 1902. (Mike-West Sussex, UK)

4575.0 NNN0XAF-US Navy/Marine Corps MARS, passing a SHARES exercise message at 1329. (Jack Metcalfe-KY)

4724.0 Andrews-US Air Force HF-GCS control point, EAM "for Scotchman," at 1317. (Metcalfe-KY) Andrews, EAM simulcast on 11175, at 1943. (Mdmonitor-MD)

4780.0 Bedford-Indiana National Guard, weekly Joint Forces Headquarters net, working Monticello, Salem, and Washington in LSB, at 1321. (Metcalfe-KY)

4921.5 WGY914-FEMA, GA, passing a SHARES exercise message in LSB, at 1308. (Metcalfe-KY)

5195.0 Unid-Weak stations in Texas Department of Transportation weekly net, at 1330. (Metcalfe-KY)

5547.0 San Francisco-North Pacific MWARA, taking positions from Philippine 105, Alaskan 854, Korean Air 12, Malaysian 95, and Asiana 283, at 1048. (Doug Bell-Canada)

5574.0 San Francisco, positions from Cactus 125 (America West), and United 54, at 1015. (Bell-Canada)

5598.0 Santa Maria-North Atlantic MWARA, Azores, positions from Air France 406, Alitalia 611, and Iberia 6400, at 0221. (Bell-Canada)

5616.0 Gander-North Atlantic MWARA, Canada, selcal check with Transoviet 554, at 2351. (Bell-Canada)

5649.0 Gander, working Turkish 02, El Al 11, Olympic 412, and Air India 102, at 2425. (Bell-Canada)

5711.0 BRD-NASA Booster Recovery Director, Cape Canaveral, FL, working Cape Radio, also Cape Canaveral, came from 10780 in shuttle launch, at 1505. BRD, working Booster Recovery Vessels *Freedom Star* and *Liberty Star*, downrange on shuttle launch, at 1953. (Allan Stern-FL)

5745.0 Mayport SESEF (US Navy Ship Electronic Systems Evaluation Facility), testing with unknown Navy vessel, at 1356. (Metcalfe-KY)

5760.0 USDAEOC2-US Department of Agriculture alternate emergency operations center, MD, also on 14955, ALE at 1500. (Metcalfe-KY)

5761.8 Unid-CW numbers (M01), sloppy hand sending in progress, ended "719 719 30 0 0," at 1835. (Mike-UK)

6227.0 Unid-Female calling the Cruiseheimers Net, small vessels checking in from the Southeastern US and the Bahamas, at 1230. (Larry Williams-SC)

6586.0 New York-North Atlantic MWARA, NY, sending AeroMexico 001 to 3455, at 0426. (Stern-FL)

6700.0 Tango Whiskey-US Navy USS *Theodore Roosevelt* Carrier Strike Group, working units using single-letter tactical callsigns, at 0039. (Tom Sevart-KS)

6733.0 IDR-Italian Navy, Rome, working "B-7-S" in French, followed by RTTY, at 2030. (Patrice Privat-France)

6765.0 AAT7WE-US Army MARS, in a SHARES Regional Net, at 1443. (Metcalfe-KY)

6785.0 Cuban CW "Cut Numbers" (M08a), 5-figure groups in progress at 1922. (Sevart-KS)

6855.0 Cuban AM Spanish female (V02a), 5-figure groups in progress at 2120. (Sevart-KS)

6858.0 ARC4751-American Red Cross, ALE sounding, also on 5140, 6858, 7549, and 7697, at 1538. (Metcalfe-KY)

7887.0 V02a, AM callup 06891 44441 78282, at 2000. (Sevart-KS)

8097.0 M08a, MCW in progress at 1821, and again at 1916. (Sevart-KS)

8180.0 Russian Intelligence 6-note selcal 241563 (X06), possibly music underneath, at 1917. (Mike-UK)

8414.5 636091465-Maritime Mobile Service Identity of Liberian registry oil tanker *Prince of Streams*, safety test with 002241078, Madrid Radio, Spain, at 0053. (Ken Maltz-NY)

8831.0 Gander, position from Speedbird 265 (British Airways), at 2358. (Bell-Canada)

8864.0 Gander, Selcal AK-FP to Air Force One, USAF VC-25A #82-8000, president aboard, at 2000 and 2019. (Bell-Canada)

8891.0 Iceland Radio-North Atlantic MWARA, Reykjavik, working ACA 854 (Air Canada), at 0450. (Privat-France)

8971.0 Fiddle-US Navy, FL, calling Fighting Tiger 21 (a P-3C), at 1835. Golden Hawk-US Navy, ME, working Tiger 21 at 1940. (Mdmonitor-MD)

8992.0 Dixie 90-AL Air National Guard KC-135, HF-GCS patch to Tinker Base Ops, at 1557. Celebrity-US military, patch to Applicant via Sigonella HF-GCS, Sicily, for orderwire coordination at 2324. (Bell-Canada)

9049.6 KEB762-US Customs Over-The-Horizon Enforcement Network remote, NM, relaying a SHARES exercise message at 1447. (Metcalfe-KY)

9110.0 NMF-US Coast Guard, MA, satellite image FAX at 1513. (Sevart-KS)

10493.0 WGY908-FEMA Region 8, Denver, CO, working WGY9467 in LSB, at 2008. (Metcalfe-KY)

11175.0 RC 595-US Navy P3-C from Whidbey Island, WA, attempting radio check with Andrews HF-GCS, at 0252 (Stern-FL) SAM 2545-USAF Special Air Mission distinguished-visitor flight (89th Air Wing, Andrews AFB), repeated no-joy calls to Andy, at 1434. Ascot 5320-UK Royal Air Force VC-10, patch via Offutt HF-GCS for weather in Canada, at 1620. (Bell-Canada) Andrews HF-GCS, starting frequency roulette with unknown unit "McDyer," going to13211, 11220, and 11460, at 1904. (Stern-FL)

11232.0 Chalice Golf-Probable USAF AWACS, patch via Trenton to Best Deal and Inclusive, went to 11175, at 1526. (Metcalfe-KY) Dragnet-US military E-3 AWACS, probably Nightwatch net, patch via Trenton Military, ONT, at 1657. (Bell-Canada) Trenton, working Waverider 331, a P-3C, at 2249. (Stern-FL)

12180.0 V02a, AM in progress at 1915. (Sevart-KS)

13088.0 Russian Intelligence "English Man" (E07), AM null-message callup "301 000," at 1700, again on 12088 at 1720. (Mike-UK)

13380.0 V02a, AM callup 10611 20131 10533, at 2000. (Sevart-KS)

13927.0 AFA1EN-USAF MARS, IN, patching Shark 67 (C-130 supporting Joint Task Force) to Coronet Oak Ops, PR, at 2017. AFA3HS-USAF MARS, patching Teal 37, Air Force Reserve "Hurricane Hunter" WC-130J, to Robins AFB regarding flight to PR for first tropical storm of the season, at 2207. (Stern-FL)

14396.5 WGY9416R-FEMA mobile in PA, checking into SHARES Control Net at 1553. NCS031-National Communications System Auxiliary Station, TN, also at 1553. KHA908-NASA, CA, at 1557. WGY939-FEMA at CA Office of Emergency Services, at 1600. (Metcalfe-KY)

16025.0 X06, selcal 156234, weak at 1435. (Mike-UK)

16178.0 SK01, erroneous RDFT parallel of 17436, at 1746. (Sevart-KS)

17435.0 V02a, repeating "Tres" at 1658, then into callup 79841 01341 30472, AM at 1702. (Sevart-KS)

17436.0 SK01, started as audio from 17515, then into usual RDFT passing file 16694437.txt, AM at 1704. (Sevart-KS)

17515.0 V02a, callup 79741 01341 30472, AM at 1600. (Sevart-KS)

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MARS on Earth

The May cover feature on Amateur Radio digital modes reminded me that it might be interesting to find out who, outside of hobbyists, use some of those wonderful modes that have originated from the ham community.

Because of their close ties with Amateur Radio, the various organizations that make up the Military Affiliate Radio Service (MARS for short) are often to be found using the latest ham modes.

Today, more than 5,000 volunteers operate this extensive network capable of round the clock communications down the block or around the world if necessary.

MARS has been known to use 300bd/200 AX.25 Packet Radio, the all but defunct G-TOR, SITOR-A and B, PacTOR-I, II and III, MT63 and PSK31.

❖ Navy MARS

Barely an evening goes past without bumping into the MARS stations of the US Navy relaying messages (MARSGRAMS as they are called) and email from station to station. PacTOR seems to be the current mode of choice for most stations, but SITOR-A still appears from time to time.

Heavy use of amateur mailbox software popular on packet radio, such as that from F6FBB, moves the majority of traffic from station to station.

Here are some frequencies to try:

MIL-188-141A ALE
3349, 5158, 11098.5, 13473.5, 14512.5 kHz USB
SITOR
4015, 4045, 5385, 5798.5, 5858.5, 6881, 6884.7, 11069, 13541, 14470.7, 14761.5 kHz CF
PacTOR
4045, 4513.8, 4516.3, 4930, 5154, 5160.5, 5296, 5798.6, 6776.5, 6836, 6881, 6969, 6971, 7993.5, 8150, 8151, 12127.5, 13541, 13854, 14761.5 kHz CF
PSK-31
5859.5 kHz CF

Navy MARS callsigns are usually formed as NNN+0+LLL. Mailboxes have an "M" as the first letter of the three-letter trigraph, and it is these stations that you probably hear the most.

Many stations only use the first NN of the callsign when using digital modes.

Stations linking with MIL-188-141A ALE seem to be transitioning to a new style of identifier where the LLL trigraph is sent first, so a station with callsign NNN0ABC will use the ALE identifier "ABCNNN".

SITOR-A selcals use N followed by the three letter trigraph. So NNN0ABC would be called as "NABC."

❖ Army MARS

Like their Navy and Air Force counterparts, the Army MARS operators can also be heard throughout the day and night on many diverse frequencies with many digital modes.

Callsigns are of the form AAL+digit+LLL where the digit follows the US Amateur Radio areas, which are as follows:

1 = Region One CT, MA, ME, NH, RI, VT
2 = Region Two NJ, NY
3 = Region Three DC, DE, MD, PA, VA, WV
4 = Region Four AL, FL, GA, KY, MS, NC, SC, TN, PR
5 = Region Five IL, IN, MI, MN, OH, WI
6 = Region Six AR, LA, NM, OK, TX
7 = Region Seven IA, KS, MO, NE
8 = Region Eight MT, ND, SD, CO, WY, UT
9 = Region Nine CA, AZ, NV, HI, GU
0 = Region Ten WA, OR, ID, AK

A few callsigns, especially those located overseas have callsigns of the form AEM+digit+LLL.

Here are some modes and frequencies for you to try:

PacTOR
3236.5, 3348.5, 4203.5, 5396, 6908.5, 10577.513244.2, 13479.5, 14511.5 kHz CF
MIL-188-141 ALE
3349, 4489, 5711, 6765, 9106, 9224, 11217, 13800, 14512.5, 15094, 17487kHz USB
75bd/200 RTTY
4033.5 kHz CF
SITOR-A and B
4001.8, 4037.2 kHz CF
AX.25 Packet Radio
5206.5, 6824.3, 6825.1, 6997.5, 13505.7, 13965, 13994.5, 14489.2, 16041.7, 16093, 16093.7 kHz CF

❖ Air Force MARS

From its headquarters at Scott Air Force Base in Illinois, the Air Force also oversees an extensive MARS operation with around 1300 members.

Again, Air Force MARS stations are very often on the air with various digital modes.
I have found them to be somewhat more at the leading-edge of the three services and appear to the most progressive at trying new ham modes as they make their appearance on the shortwave bands.

Here are some digital frequencies to try for:

MT63
4025, 4050, 4873.5 kHz CF
PacTOR
4876.5, 4906, 6774.1, 6776.5, 7681.5, 9048.5, 10268.5, 13244.2, 14528.5, 14529.4 kHz CF
AX.25 Packet Radio
7682.4, 14530, 14531.9 kHz CF
G-TOR
14530.1 kHz CF
MIL-188-141A ALE
3349, 5740, 11098.4 kHz USB
SITOR-A and B
7832.5, 7915 kHz CF

❖ Rare VFT Back On Air from Down Under

And now for a few rarities to check on.

Despite the generally lousy reception conditions recently, the early mornings have been bringing in the Royal New Zealand Navy's old-fashioned BR6028 or "Barrie" style VFT system with great strength.

This is a great chance to hear this rare system on the air. It runs seven channels of 75bd/170Hz shift RTTY, which are encrypted, with each channel sending the same data with a slight time delay from the adjacent channel. A continuous pilot tone at 560 Hz above the carrier point keeps the whole VFT on frequency.

Frequencies to try include:
11010, 13458.2 and 13508.2 kHz USB

When conditions get better, the VFT has also appeared on 20185 and 23165kHz USB.

❖ Rare Saudi ARQ-E System

This network is very active, using a very unusual speed of the ARQ-E system, namely 46.1 bd with a 170 Hz shift. The network is rumored to be operated by the Saudi Military for communication between airfields.

Some channels carry single channel ARQ-E; others close-by carry ALE on the lower sideband, which triggers a most unusual BR6028 VFT carrying 7 channels of the ARQ-E. The stations are idle for long periods with occasional status messages of the type: zczc kaa900 wka900 88

Here are some frequencies to try:

ARQ-E
2818.8, 3239.8, 3298.8, 3755.8, 3843.8, 4453.8, 4455.8, 4538.8, 5402.8, 5403.8, 6813.8, 7991.8, 9084.8, 10133.8, 10296.8, 13428.8 kHz CF
BR6028
4906.7, 8041.7, 10295.7, 10450.6, 10544 kHz
ALE
4457, 4910, 5405, 5750, 6924, 6944, 7990, 8045, 9086, 11090, 11138 kHz LSB

The ALE is usually directed between the following stations:

AAI to RHI JDI to RDI
AAN to RHN JCI to RFI
AAP to RHP JCN to RFN
JCU to RFU JDP to RGP
JDN to RDN JCP to RFP
JDN to RGN REN to TAN

That's all for this month. Please keep the letters and emails coming.

RESOURCES

US Air Force MARS HQ - **www.marsregion-one.org/**
US Army MARS - **www.netcom.army.mil/mars**
US Navy MARS - **navymars.org**

GLOBAL FORUM

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Singapore Shutting Down Shortwave

Radio Singapore International, run by MediaCorp Radio, is shutting down at the end of July. Set up in February 1994, RSI broadcasts to the region in four languages: English, Chinese, Malay and Bahasa Indonesia. MediaCorp said that effectiveness of the SW radio service has 'diminished over time with changing technology and media consumption habits'. The majority of RSI's listeners, particularly those from its popular Chinese service, are middle-aged and older. RSI has been unable to attract young listeners in recent years, and that could be one reason for its demise. So reported the *Straits Times*, via Zacharias Liangas.

It also said staff would be redeployed, implying that RSI will no longer exist at all, not even webcast. It's well-heard here during English at 1100-1400 on 6080, also on 6150, although in Oklahoma summers fading out well before 1400.

More Stations Imperiled

More on the impending demise of SWBC from **Spain**, per F. Álvarez writing in the Spanish magazine *ABC*, via José Miguel Romero: Main problem is the cost of broadcasting on SW and satellite – technologies which have been surpassed by internet, and which consume most of the expenses of REE, with 72 employees, a number which must be maintained. The intention is to facilitate migration to internet. One of the commitments for the coming years is to beef up programming in English and Arabic, and to start a Mandarin service in 2010, but not on SW.

Another story, in *La Razón*, talks of closing REE, despite its role in maintaining contact with the rest of the Spanish-speaking world of 400,000 people; it's in a constant state of crisis. Parent organization RTVE released new logos for its networks effective in September – and REE is missing; see: **www.formulatv.com/1,20080607,7802,1.html**

Romero says the external service has the lowest priority and no one wants to take the bull by the horns to protect it.

The **German** newspaper *taz* published an interview with Deutsche Welle director Erik Bettermann. Kai Ludwig provides key points in translation: Abandoning shortwave is unavoidable, not only because it's so expensive, but also because even people in traditional radio continents like Africa make little use of it anymore, mostly limited to rural areas. In the towns one has to be on FM to reach listeners. Presumably we will be on shortwave a bit longer in certain areas like China.

How will DW reach its audiences in future? TV will be what opens the door, and for deeper coverage there will be either a radio service or website in the respective languages, including audio and video podcasts. We want to further strengthen the convergence between our three media: TV, radio and online.

The shortwave exit concerns a complete engineering department. I guarantee that no lay-offs will take place while I'm in office. But it is a matter of course that people have to be prepared for changes, be willing to retrain.

Kai's comment: it has been said that the shortwave transmissions of DW will end altogether by 2012 or 2013. Maybe a few services will still remain after that deadline, but entirely managed by VTC, or whoever they may choose as contractor then.

But there is good news, too, for the future of shortwave; for example, below at AUSTRALIA, BRAZIL, MEXICO, PAKISTAN, ROMANIA, VENEZUELA...

ALBANIA WWRB, registered with the FCC in A-08 to close 9385 at 2300, insisted on keeping it on with Brother Stair until about 2355, blocking R. Tirana, Albanian to NAm at 2300-2430 on 9390. Finally on June 12, R. Tirana moved to 9345. Also Albanian to Europe at 2030-2200 from 9390 to 9395 to avoid Algiers relay, though by then the latter had ceased another temporary relay via France. English to Europe at 2000-2030 shifted 7460 to 7465 to avoid IBB on 7455 (gh)

ARGENTINA RAE was put off the air May 29-June 1 due to another theft of cables at the transmitter site, which prevented the studio program feed from reaching the senders (Gabriel Iván Barrera, *condiglist* yg) In such a case there are microwave links (Alfredo Cañote, Perú, *ibid.*) Yes, but when there is so little interest in SW, why bother? (Arnaldo Slaen, *ibid.*) Heard again June 2 at 2200 on 15343.9 going from German to multilingual IDs to Spanish (gh, OK)

AUSTRALIA New Greek-language station is on 2368 kHz, maybe 24 hours (Chris Hambly, DX LISTENING DIGEST) There were several applications for this frequency. Can it make it to Europe, North America? (gh) I think so. An extremely weak signal with music heard on 2368.47 at 1950 but faded away by 2030 (Mauno Ritola, Finland, *ibid.*) But I think they will be disappointed with local coverage on 120m (gh)

First heard at 1000 May 17 on 2368.47, Radio Symban, 1 kW from a 20m-high antenna near Gosford (Peats Ridge), NSW. Radio Symban also operates a 151 MHz subscription transmitter as well as holding various expanded band (1611-1701 kHz) licenses around the country. See **www.radiosymban.com.au** (Richard Jary, Australia, ARDXC) Initially just music testing; later IDs and ads. Reports will be verified via email only to *symban@radiosymban.com.au* and the subject line must be "Reception Report." You can include an MP3 file. Thanks to John Wright for managing to contact them and get those details (Richard Jary, *DXLD*)

These ACMA 1 kW SW Licences are cheap. Was only on air initially until May 19 (Keith Ashton, Double V SW Radio, another applicant for 2368.5, *dxing.info*) Symban means the Universe. *Cfr. syn-/sym-* and *pan-* (Olle Alm, Sweden, *DXLD*) Symban began regular broadcasting on June 11 (Wright, *DXLD*)

All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; sesqui = one and a half; A-08=spring/summer season; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated

BIAFRA [non] V. of Biafra International, via WHRI, Fridays at 20-21, in April and May was on 17650; per FCC skeds was supposed to shift to 15280 June through August, but the first week in June was still on 17650, as monitored by Walt Salmaniw, José Miguel Romero and Anker Petersen. And also June 13 as we heard it. Has excellent local-like signal, with only occasional quick deep fades to remind us the ionosphere is involved. Main speaker is a very persuasive orator, and it's hard to tune away as he details charges against the vicious Nigerians. Mostly in English, but at times alternating with Ibo (or Igbo?), a tonal language. WHR online sked mentions Oguchi Nkwocha who may or may not be the speaker. Much more including audio at **www.biafraland.com/vobi.htm** (gh)

BOLIVIA After a spell on 4111v, R. Virgen de Remedios, Tupiza appeared on 4005 from mid-May with religious ceremony in Spanish at 2315; besides local programming also relays WEWN, R. Católica Mundial (Lúcio Otávio Bobrowiec, SP Brasil, *HCDX*) Another Catholic station is on 4005, Vatican Radio direct, but pausing 2215-0225; its only Spanish is at 2020-2040 (gh) But Vatican also heard on 4005 until 2330 in Italian (Dave Kenny, England, BDXC-UK Communication) One evening Remedios appeared to be on 4800 instead (Rogildo Aragão, Bolivia, and Bobrowiec) But since then on 4005.50v (Samuel Cássio Martins, and Ulysses Galletti, SP, Brasil, DXLD)

BRAZIL R. Imaculada Conceição, Campo Grande MS, became widely audible in mid-May on 4754.9 as it was all-night: 0535-0601, also ID as Rádio Maria (Manuel Méndez, Spain, *DXLD*) I tune 60 mb just about every night around 0600, and never heard anything besides CODAR on 4755 until May 20 at 0621; sounded more like a commercial station than religious (gh, OK) 0253-0305, bits of beautiful choir hymns. 60 dB signal with superb audio (Richard W. Parker, KB2DMD, PA, *DXLD*) 0433 with call-in (Jim Evans, TN, *Cumbre DX*) 0452 ID with FM frequency (Bryan Clark, New Zealand, *NZ DX Times*)

On 5980.55, R. Guarujá, Florianópolis SC, 2334 in late May, Portuguese talks about Brazil, weak but fair audio (Maurits Van Driessche, Belgium, *DXLD*) 5980, 2145-2200 football; also 1040 Sunday with "PLUG 700" program made by Rede Eldorado (Arnaldo Slaen, Argentina, *ibid.*) Our 5980 SW outlet is

back on the air after a long period of hibernation with grave technical problems, but also webcast via

http://www.radioguarujá.com.br (Carlos Alberto Silva, R. Guarujá, via Marcelo Bedene, *DX Clube PR* yg)

R. Globo, Rio, listed inactive in *WRTH* 2008, fair and clear at 2053 in mid-May on 11804.7 (Craig Seager, NSW DX-Pedition, *Australian DX News*) 11804.71, Portuguese talk in slight echo at 2316, late May, past 2349; 11804.8, at 1035-1054 early June (Manuel Méndez, Spain, *DXLD*) 11804.74 at 2013 with amusement program (Maurits Van Driessche, Belgium, *BDX*)

BULGARIA DRM tests of Bulgarian National Radio, Horisont program from May 26, 20 kW, 306 degrees to WEu from Sofia: Mon-Thu 09-12 11895-11900-11905, 13-16 9695-9700-9705; Fri-Sun 06-12 11895-11900-11905 (*DX Mix News*, Bulgaria) Later plans to put English, French, German and Spanish on DRM (*DRMRX forum* via Mike Barraclough, *DXLD*)

CANADA Hello Glenn, We are planning some major upgrades to all the transmitters at CHU, this summer (Ray Pelletier, NRC, *DXLD*)

CHINA [and non] Sichuan PBS, broadcasting from the area of the quake, heard on 6060, 7225 and new 9740, with relay of CNR-1 at about 1200-1232. At other times they are mostly all parallel, but on May 19 at 1105, 9740 not parallel to anything, so assume they actually had Sichuan PBS-1 programming. 6200 relayed CNR-1 for 24 hours a day (Ron Howard, visiting Shanghai, *DXLD*) Another new frequency was 13840, which forced New Zealand and Netherlands to move (gh)

One week after the earthquake, I could hardly believe my ears the morning of May 19 when all Firedrake lively musical jamming had vanished – but jamming continued full force, just replaced with CNR-1 programming as source. This coincided with a 3-day mourning period for quake victims, but Firedrake did not resume until 10 days later (gh)

The title of Firedrake is *"Fengshou luogu"*. A 6-minute clip:

http://peek.snipurl.com/2iv7w (Hiroshi via S. Hasegawa, NDXC, *DXLD*) Labeled as: Hong Kong Chinese Orchestra / Yan Hui-chang.

Temporary replacement by CNR 1 was not a suitable gesture of respect for the victims but instead demonstrated the cynical nature of Chinese censorship, since the authorities (or, in fact, SARFT in particular) more or less admitted direct responsibility for the jamming (Kai Ludwig, Germany, *DXLD*)

By early June, Firedrake had again invaded to 20m hamband, to block Falungong's Sound of Hope, at 1320 on 14010 (gh) Also monitored at various times on 14000, 14005, 14030, 14050, 14090. Another protest filed with the Chinese authorities (Ulrich Bihlmayer, DJ9KR, Coordinator of DARC Monitoring System Intruder Watch and Spectrum Control, *DXLD*)

[non] CRI's 0100 English to NAm: on one occasion // on 9570- Albania and 9580-Cuba, allowing unfavorable comparison of much better audio quality on former. But another evening, two separate programs: regular CRI on 9580 and 9790-Canada; domestic *China Drive* from Easy FM on 9570 and 6020-Albania (gh, OK)

COLOMBIA 6035, La Voz del Guaviare, heard on Sunday at 2230 with musical variety, numerous IDs only as Radio Uno, then 2300 Guaviare ID, too, relaying one of the RCN FM stations on weekends (Santiago San Gil, Venezuela, Club Diexistas de la Amistad, *DXLD*)

CUBA More than once we have heard RHC in English at 2300 on unlisted 11750 in addition to 9550, but it's just a sloppy overrun as late as 2308 of 11750, supposed to be turned off at 2300.

RHC's recent new frequency 11680, like all of them, unregistered with HFCC, collides with Spain, also in Spanish to South America for two hours at 0000-0200. RHC stays on 11680 until 0500, then colliding with DRM from 11675 Kuwait until 0300, and RNZI DRM from 11675 after 0300.

Cancionero Iberoamericano music show, Saturdays at 1430 on all RHC morning frequencies, repeats at unscheduled time of 2200 on 9550.

[non] R. República resumed broadcasts via Germany in mid-May, Tue-Sat 01-02 on 5955 via Nauen, 125 kW, 285 degrees, hit by jamming in a few days; and also live morning show *Amanecer* via Sackville, M-F 1000-1100 on 9490, 250 kW at 227 degrees.

On June 5-7, continuous Cuban music tests with no announcements appeared at 1600-1900 on 15460, 1900-2200 on 17660. Tunes such as *Guantanamera, Cuba Linda* and *Cuba Libre* repeated frequently; first reported by José Miguel Romero, Spain. Due to strength but no IDs, we suspected a North American site outside USA, probably R. República contemplating a much expanded, 24h? service. From June 9 similar Cuban music tests appeared on 6100 from before 0900 past 1300, per Chuck Bolland, Harry Helms and gh; and also until 1500 on 7365, but these had WHRI IDs on the hour. 7365 is used at other times by R. Martí. DentroCuban jamming soon hit most of these, and continued after the tests finished (gh)

EGYPT [and non] R. Cairo's European service on 11550 collided with WEWN, but Cairo was slightly off frequency, at first 11550.1, later 11549.4 putting a big het on WEWN, including Cairo in English at 2115-2245, while WEWN relayed Vatican in Spanish weekdays at 2100-2130. As usual, Cairo modulation was weak, so it lost the battle even when its carrier rivaled WEWN or propagation favored Egypt (gh)

ERITREA [and non] The Eritrean information minister announced that V. of the Broad Masses of Eritrea would be adding a third network on 24 May, which was Eritrea's independence anniversary. See: **www.shabait.com/staging/publish/article_008314.html**

A friend in east Africa says he hasn't heard any more about this; it's difficult to hear any VOBME broadcasts because of Ethiopian jamming, often using V. of the Tigray Revolution as the jamming signal (rather than Radio Ethiopia). Perhaps this is why DXers have been hearing Eritrea on extra frequencies recently? (Chris Greenway, England, *WORLD OF RADIO*)

ETHIOPIA 6030, Radio Oromia (transmitter site Geja Dera?) address is P. O. Box 2919, Adama, Ethiopia. Identifies as *"Kun Sagalee Raadiyoo Oromiyaati"* (= "This is the Voice of Radio Oromia"). Radio Oromia is funded by the Oromia State government, not owned/operated by Radio Ethiopia; they still have their own separate Oromo language service. Number of staff is currently over 250 (Ilpo Parviainen, Finland, *DXLD*)

Visiting Ethiopia in January, Maarten Van Delft reported the schedule as daily 0400-0600, 0900-1100, 1600-1800, must be 100 kW. So look for it UT Mondays at 0400 when dentroCuban jamming and Martí are in truce, and not to be confused with Radio ICDI, Central African Republic, from 0500? (gh) See also SUDAN [non]

INDONESIA When on the air, VOI's 31m transmitter normally shows on 9526 before 1400, making a 1-kHz het with China in Russian after 1400. But two days only in late May, VOI was back on correct 9525, or at least within 100 Hz of it; two different transmitters? (gh)

IRAN [non] Now that Morocco transmitter site is no longer involved, Radio Farda is a lot harder to hear in NAm. We asked *DXLD* yg members for their suggestions. Greg Neide in OH and Sheryl Paskiewicz in WI agreed that 7280 via Germany was the best bet around 0200-0400, actually starting at 0030 (gh)

KOREA NORTH [and non] North Korea Reform Radio, daily 1300-1330 on 9940 via Taiwan, also makes it to CNAm, carrier on as early as 1252, and jammer on by 1259, pulsing with pitch varying slightly. Not 9950 as given last month (gh)

MÉXICO XEXQ, SLP engineer Francisco Moreno tells me that the inverted V antenna for SW 6045 had to be lowered from the roof to ground level, greatly weakening the signal, because of interference it was causing to their AM and FM links. They also hope to get 1 kW authorized instead of 250 watts (Julián Santiago Díez de Bonilla, DF, *DXLD*) On a quiet morning we were still able to detect their classical music, ID at 1302 (gh, OK) On 6044.94 at 1243 with chamber music (Terry L Krueger, FL, *DXLD*)

6104.6, at 1150-1202 in mid-May, extremely weak unID with still weaker audio, drums at 1200 (Jim Evans, TN, *Cumbre DX*) 6104.63, Spanish at 1029-1040 in early June (Chuck Bolland, FL, *DXLD*) 6104.5, mentioning Mérida at 1200-1230 (Bob Wilkner, FL, *Cumbre DX*) XEQM was last reported about 5 years ago relaying Candela FM (gh) Candela FM ID on 6104.77v, at 2131-2142, 1306-1316 down on 6104.46 (Terry L Krueger, FL, *DXLD*)

The manager of the RASA Mérida group says 6105 had been back on the air for two months, with a few lapses. It's the old 250 Watt unit; they are trying to get funding for a new transmitter. Plan is to broadcast 24 hours a day, half of that in Maya, a good idea for regional coverage into CAm, and the other half relaying the network's flagship on 620 in Mexico City. Heard weakly at 2300, and also at 0017 with music in Spanish, ID as Rasa Mérida 95.7, so FM relay (Julián Santiago Díez de Bonilla, DF, *DXLD*) XEMQ 810 is already in Maya. 6104.9, very weak here after Asia faded, 1350-1430+ (gh, OK)

MOROCCO Had stayed on UT yearound, but unexpectedly went on DST of UT +1 June 1, for a trial period lasting until September 28, to save energy and put it closer to Europe (*timeanddate.com*) There are very few SW transmissions left, but 15345 appears to close an hour earlier at 2100, clearing frequency for Argentina in German (gh)

NEW ZEALAND RNZI cannot make frequency changes on short notice; it takes a few days as engineers have to go to the (normally unmanned) Rangitaiki transmitter site to do complicated exercises: two transmitters run through combiner into one antenna, and combiner has to be retuned each time frequencies are changed, says Adrian Sainsbury on *Mailbox* (gh)

PAKISTAN As of late May, Radio Pakistan had spent 60% of the US$7.2 million allocated for installing two new 100 kW SW transmitters at Landhi near Karachi (Aslam Javaid, Lahore, *DXLD*) To replace two old 50 kW, from 1948-49, off air due to unavailability of parts, services shifted to overloaded Islamabad facilities. Associated new equipment at Landhi includes two rotatable curtain antennas, one for 6-11 and the other for 13-26 MHz (via Alan Davies, Indonesia, *shortwavesites* yg via *BC-DX*) Must be of the Grassvalley Thomson-Thalès type erected previously at Sines, Portugal; Kuwait; and in Çakirlar and Emirler, Turkey, too (Wolfgang Büschel, *BC-DX*)

Radio Pakistan audio link is functional. Not only Islamabad station but World Service in Urdu from

www.radio.gov.pk (Aslam Javaid, *DXLD*)

Apparently not including English at 1600-1615, or rather 1500-1515, frequencies presumably unchanged, 9385, 11565, 15625.4 per *DX-Mix News*, Bulgaria; since like Morocco, Pak went on DST June 1, UT +6, which absurdly puts it a semihour ahead of India, which is east of Pakistan, rather than a semihour behind India. *timeanddate.com* expects it to last until August 31.

Yet another station too inward-looking to figure out that external broadcasts should not shift all programming by an hour on same frequencies without considering the interference impact on everyone else who are not shifting (gh)

Urdu broadcast now at 0730 still concludes with English news an hour earlier now at 1000-1005 on 15100, 17835 (Erik Køie, Denmark, Wolfgang Büschel, Germany, *DXLD*) Kashmir service on 4790 also open-

ing an hour earlier at *2345 (Anker Petersen, Denmark, *playdx* yg)

Murtaza Solangi, a journalist with the Voice of America in Washington, will be the new Director General of the Pakistan Broadcasting Corporation (*The News*, Pakistan via *Media Network* blog)

PERÚ 4857.5, Radio La Hora, Cusco, reactivated in late May, heard 2145-2305, with ID mentioning FM, AM and SW (Rogildo Fontenelle Aragão, Bolivia, *playdx* yg) Had been off the air more than 3.5 months, problems with dipole antenna, now back on 4855 [*sic*] with new antenna, 2 kW, M-F 10-15 and 23-24 UT; new QSL and pennant, DX reports wanted to adalidcusco@hotmail.com or to Avenida Garcilaso 411, Distrito de Wanchaq, Cusco (Carlos Gamarra Moscoso, frequency manager, *playdx* yg) On 4857 at 2333 with ads, sports, 0006 ID (Lúcio Otávio Bobrowiec, Brasil, *WORLD OF RADIO*) Tentatively this until 0306* on 4854.92, native music (Anker Petersen, Denmark, *playdx* yg)

PHILIPPINES Radio Veritas Asia informs that during typhoon Cosme, nine out of fifteen antennas at the Palauig transmitter site were destroyed. Some broadcasts were substituted with available spare antennas at wrong azimuths, e.g. Vatican relay in Chinese at 1220-1315 on 6020, 280 degrees instead of 355 (via Alokesh Gupta, *DXLD*)

ROMANIA R. Romania International announced in mid-May that they would be reducing their SW frequencies for the next couple of months while they upgrade/replace their transmitters. The revised English schedule had only half the number of frequencies for each broadcast as in their original A08 schedule. Galbeni site is off first for installation of new 300 kW units. Once it is back on, Tiganesti will go off for replacements. Details: **www.rri.ro/art.shtml?lang=1&sec=8&art=11871**

Including to ENAm at 0000 on 9775 only; WNAm 0300 on 6150 (via Alan Pennington, *BDXC-UK* yg) This upgrade was supposed to start last fall, so they must be running 6-8 months behind (gh) Some of the Tiganesti transmitters remaining on air wander off-frequency (Wolfgang Büschel, Germany, *BC-DX*)

SAUDI ARABIA BSKSA Riyadh had been broadcasting nothing but big buzzes, or maybe traces of audio underneath, for many months from at least one of its transmitters, such as 15170 at 0300-0500, 15205 at 1600-1800, 11915 at 1800-2300. Nothing was done about it, the Sa'udi engineers apparently unaware or uncaring, and no official complaints filed, though this had been reported repeatedly in *DXLD* and other monitoring publications.

In mid-May the situation got much worse, with the buzz and spikes expanding hundreds of kHz above and below these frequencies, interfering with countless other SW stations, as monitored by Wolfgang Büschel and Kai Ludwig in Germany, Chris Lewis, Harry Brooks in England.

If this had happened in a ham band, there would have been hell to pay with intruder watchers immediately filing official complaints. But the impetus to fix this still had to come from an individual listener, Mike Barraclough in England, who contacted HFCC about it. He was hearing the 15205 transmitter covering from 14570 to 16135! HFCC contacted BSKSA and the situation seemed to have been fixed in early June (gh)

"We faced unstable electrical mains supplying our transmitters for a few days, which might have affected our transmission. We took an action against this problem by repairing the affected transmitter," said the Sa'udis. I don't buy their explanation, and it was more like a few years than a few days, but thankful if it is gone anyway (gh) Suspect the problem was a malfunctioning exciter (Kai Ludwig, *DXLD*)

SÉNÉGAL [non] West Africa Democracy Radio, via Skelton UK, VT Communications, 0700-1100 on 17875, was cancelled from May 19 (*DX Mix News*, Bulgaria)

SERBIA [non] International Radio Serbia, to North America in Serbian and English between 2330 and 0130, had been colliding with Radio Educación, México on 6185 since the beginning of the A-08 season. We noticed that there was nothing on 6190 and asserted that Serbia should move there. Dragan Lekic, SWL in Serbia, passed on this suggestion to the station, and they did so May 30, resolving the collision, although in summer 6 MHz is not effective from Europe as far as CNAm. The Croatians have a better idea, booming in via Germany on 9925 (gh) But IRS very good here on 6190 (Brian Alexander, PA, *DXLD*) Reports wanted to *radioju@sbb.co.yu* (Lekic) The closing announcement mentions neither 6190 nor 6185, just the European frequencies for the earlier broadcasts, 6100 and 7240 (gh)

SUDAN [non] Miraya FM Radio, in English/Arabic via Slovakia at 1500-1800, moved from 9825 to 15650, 150 kW, 160 degrees. Very good signal but collides with strong Voice of Oromiya Independence in Oromo/Amharic, Saturday only at 1700-1730 via Germany (Ivo Ivanov, *DXLD*) One of which has probably had to move by now (gh)

U S A *Gartner v. USIA* ruled that VOA cannot distribute its materials within the United States, but any U.S. media operation can, of its own accord, use VOA material. U.S. newspapers, cutting down on foreign correspondents and bureaus, might be tempted to tap the VOA website, generally unencumbered by copyright issues, for their foreign coverage. *The Raleigh Chronicle* and others have already done this (Kim Andrew Elliott, *kimandrewelliott.com*) Some domestic ethnic radio stations also relay VOA shows in their languages (gh)

[non] *WORLD OF RADIO* has been invited to appear via IRRS, based in Italy, Fridays at 1930 on 7290 with 150 kW. We hope this will make *WOR* more audible in Europe and beyond (gh)

In Mid-May, WRMI, 9955, added a new program, *Overnight AM*, M-F 2100-2400. So WRN relay ends an hour earlier than 2200, and the 2200-2400 programs, including DX shows and R. Prague relays, shifted to 0100-0300 Tue-Sat, formerly *Christian Media Network*. New *WORLD OF RADIO* time: Fridays 0100 (Jeff White, WRMI)

Overnight AM originates in Oklahoma City, ''for the paranormal community," Art Bell wannabees. WRMI did more work on its 317-degree antenna resulting in some signal improvement; but we noticed a heterodyne from 9956 at 1500-1700, which is the intentional frequency of Family Radio via Taiwan; why? (Glenn Hauser, Enid)

Good Friends Radio Network – Rod Hembree, *Radio Weather*, etc., pulled out of WBCQ in mid-May, leaving no major clients for 9330 and 5110 kHz transmitters, also putting an end to *Area 51*. But within a few days, Brother Stair took up the slack, buying them out almost 24/7, plus filling open spaces on 7415 vacated by Christian Media Network. New 15420-CLSB continued with the sort-of-anapestic-metered *Words of the Spirit*, afternoons from NM, with *WORLD OF RADIO* moved up to 2100 on Wednesdays; also Thursdays 2330 and Mondays 0415 on 7415 (gh)

Ted Randall, WB8PUM, who did interview shows on KAIJ, started *QSO with Ted Randall*, on WBCQ, UT Sundays 0300-0400 on 7415. First guest was Ronnie Milsap, WB4KCG; see

http://tedrandall.com (gh)

Unidentified in Spanish at 0115-0200+ on 11170, fair with fading and static; I was monitoring 11175 for milcomms (Ed Insinger, NJ, *DXLD*) It's a leapfrog mixing product of WEWN, 11870 in Spanish over 11520 in English, which could happen any time between 0000 and 0600 and also the other way on 12220; also check Spanish // 5810 and see also EGYPT (gh)

DRM is in the works at WYFR, but I couldn't tell you when: internal politics and choice of build-out vendors. It may be a while before any ones and zeros hit the airwaves from Okeechobee. I'll cue everybody when it's about to happen (JT, *drmna* yahoogroup)

WHRI transmitter usage and frequencies kept changing, concerning *Hmong Lao Radio*, Sat & Sun 1400-1500 (and also *Hmong World Christian Radio* Sat 1500-1530), which we enjoy for their exotic music. Normally on 11785, but on June 1 only on unlisted 11750 instead. The 11785 transmitter also put out big distorted spurs around 11771 and 11799 for a week, interfering with Anguilla, Cuba. Although scheduled daily from 1300 to 2400, 11785 was usually off the air most of the morning on weekdays. Once Cuban music tests started on 7365, it sounded like 11785 had gone back to a 250 kW unit, instead of 100. Schedules on the WHR website did not keep up with such details (gh)

KVOH, 17920 spur, at 2117, a regular beat like a washing machine agitator, // 17775 which had the same beat plus *norteña* music. This has been going on for years, and KVOH hasn't noticed, or if they have, don't care. Aren't there any aeronautical mobiles around 17920 getting blotted? Perhaps they don't know the source, not reading our publications (gh)

At 0637 I was surprised to hear Russian on 5920, so is it R. Rossii, Kamchatka, scheduled 22 hours a day? But the signal is too strong, and no QRM from WBOH. In fact, the modulation is crummy, so it must be WBOH! Yes, on their schedule M-F at 0635 for 5 minutes is The *Spoken Word of God – in Russian* and clinching the ID, // WTJC 9370. These are otherwise almost all in English except for a couple of Spanish quarter-hours (gh, OK)

More from Kevin Alfred Strom's ex-wife: **www.rickross.com/reference/alliance/alliance26.html** (Kirsten Helene Kaiser, VA, DXLD)

Sporadic E in May and June allowed broadcast auxiliaries to enliven 25 MHz for a while at skip distances, notably from Fort Worth, WBAP on 25910 and KSCS on 25990 NBFM, both really called WQGY434, reported by Bill Hepburn, Ont., *WTFDA* and David Hodgson, TN, *DXLD*, who also regularly hears KOA Denver relay on 25950. And he found a new one on 25870 with automated oldies from KLDE, 104.9, Sonora/Eldorado TX. El Dorado is the town near the LDS polygamy compound. Curtis Sadowski also heard all four of them in IL, 25950 being a regular. No point in citing the times, as that all depends on when openings occur. 25870 used to be occupied by WFLA in Tampa, but not heard in some years (gh)

VENEZUELA The RNV website has an article about their new SW plant under construction, forwarded by José Miguel Romero. Engineer Palacios says it is well-located for propagating to all of America, in the center of the country, at Calabazos. But this is nonsense, since being in the center of Venezuela is no better than being anywhere else in Venezuela, as far as propagation to the rest of the Americas. That's the first time I've seen the actual town, rather than just somewhere in Guárico state: it's on the only main road southward from Caracas.

Target date was to start broadcasting in 18 months, which would be late 2009. The first phase will be to reach North America, and will take another year to start broadcasting to Latin America. Of course, RNV is already heard all over N&S America; Palacios acknowledges that RNV SW is transmitted via Cuba. RNV will merely become more self-reliant, perhaps just in time (gh)

Until the Next, Best of DX and 73 de Glenn!

BROADCAST LOGS

NOTEWORTHY LOGS FROM OUR READERS

Gayle Van Horn, W4GVH
gaylevanhorn@monitoringtimes.com
http://mt-shortwave.blogspot.com

0051 UTC on 4716.7
BOLIVIA: Radio Yura. Announcers Spanish talk and Bolivian music to very weak station identification at 0100. Poor to fair signal quality (Scott Barbour, Intervale, NH). Additional Bolivian stations in Spanish: **Radio Pio XII** 5952.45, 0130-0215 (Chuck Bolland, Clewiston, FL) **Radio Santa Cruz** 6134.80, 0137-0224 (Ron Howard, Monterey, CA) 6134.82, 0905-0930; 1108-1135; 4716.63, 1005-1020 (Bolland) **Radio Pio Doce** 5952.44, 0220-0232* (Brian Alexander, PA) **Radio Mallku** 4796.40, 1012-1030; **Radio Mosoj Chaski** 3310, 1025-1035; **Radio San Miguel** 4699.35, 1030-1040 (Bolland).

0144 UTC on 6925
PIRATES: WMPR (tentative) 0144. Station playing techno music generally noted as associated with pirate WMPR, but no ID heard. Fair signal quality. **WAIR** 6925USB, 2258-2329. ID and defunct Nebraska pirate mail drop mentioned. **Moonshine Radio** 6925USB, 2347-0004. Music variety from '80s and '90s era to "Moonshine" ID. Parody program's focus on two pirate operators (Joe Wood, Greenback, TN).

0300 UTC on 4754.9
BRAZIL: Radio Imaculada Conceicão. Countless announcers in Portuguese with brief religious talks and various musical bits. Signal poor-fair (Barbour). 0911-0930 (Bolland). Brazil's **Nacional Amazonia** 11780, 0000 (Mike Branco, NY).

0410 UTC on 6165
NETHERLANDS ANTILLES: Radio Netherlands-Bonaire relay. Program segment describing a Romanian Festival in Bucharest. SIO 444. Relay noted in Dutch 15315 at 2140 (Stewart MacKenzie, Huntington Beach, CA).
Streaming audio and podcast **www.radionetherlands.nl/**

0435 UTC on 9720.03
PERU: Radio Victoria. Spanish talk segment to phone chat. Peruvian anthem at 0501. Spanish music at 0504 to religious sermon. Weak signal, better on // 6019.44 (Alexander). 6019.42, 0830-0840 with emotional religious sermon (Bolland). Peru's **Radio Libertad** 5039.2, 1055-1057. Weak signal amid Spanish programming (Jim Evans, Germantown, TN).

0501 UTC on 4777
GABON: RTV Gabonaise. Think I tuned in at the close of French opening announcement. Phone chat with someone in Bamakó to nice Afro music to 0525 tune-out. Very good signal with CODAR only a minor nuisance (John Wilkins, Wheat Ridge, CO; Alexander). Gabon's **Afrique Numero Un** 9580, 1747 French (MacKenzie).
Streaming audio and podcast **www.africa1.com/**

0717 UTC on 9800
MONACO: Trans World Radio. English text regarding missionary drivers. Musical ballads at 0721 into "live" religious service at 0724 through 0730. Fair signal quality (Barbour).

0820 UTC on 4989.99
SURINAME: Radio Apintie (tentative). Station audible only periodically due to CODAR interference blocking the frequency. Manage to hear music under the junk. Observed on frequency 1034-1045 in Dutch as signal improves from threshold at 1034 to poor at 1037. Best I've heard Apintie in a long time, audible to 1044 (Bolland).
Streaming audio **www.apintie.sr/**

0830 UTC on 6055
JAPAN: Radio Nikkei-1. Half-hour Saturday program mix of Japanese/English *Let's Read the Nikkei Weekly*, followed by *Gregory Clark's Choices* segment. Signal quality fair.
On-demand and podcast at Japanese website **www.radionikkei.jp/lr** (Howard). **Radio Japan** 9750, 1049-1100 Japanese (Bolland). Radio Japan in Japanese 9835, 1730; 9835, 1842 ; 3650, 2238 Chinese (MacKenzie)
Streaming, on-demand audio, video and podcast **www.nhk.or.jp/nhkworld/**

0830 UTC on 7355
USA: KNLS-Alaska. Carl Mann's *DX Tips* segment at tune-in. Familiar program format from male/female host. Parables of listeners' testimonials. Poor signal and fading (Barbour). 7370, 1123-1130. Russian to contemporary Christian vocals to announcer. Poor signal deteriorating quickly. SINPO 23322 (Evans)
On-demand audio **www.knls.org/**

1118 UTC on 7260
THAILAND: Radio Thailand. Khmer service via lady announcers text. Close of broadcast at 1129. Weak signal on clear frequency. SINPO 24332.
Streaming and on-demand audio **http://nbt.prd.go.th/** (Evans) **BBC WS relay** 11955, 1710 English; **VOA relay** 13775, 2225 Chinese (MacKenzie).

1151 UTC on 3345
PAPUA NEW GUINEA: Radio Northern. Pop to regional island music. National anthem to English closedown. Signal peaked about 1230 at S-9 +5dB. Very weak carrier observed on 3344.95, probably Indonesia's RRI-Ternate. PNG's **Radio New Ireland** 3905, 1230-1315 Pidgin service amid noisy band conditions and amateur radio operators on frequency after 1300. Carrier left the air at 1315 (Wilkins).

1221 UTC on 4790.04
INDONESIA: RRI-Fak Fak. Qu'ran recitations to 1225, followed by Bahasa Indonesian past 1230. Audible to 1233 tune-out. Fair signal noted with pesky CODAR interference. **RRI-Serui** 4604.94, 1259-1320; **RRI-Wamena** 4869.94, 1159-1227, both in Indonesian (Wilkins). **Voice of Indonesia** 11784.88, 1937-2018.* Tune-in to French, into English at 1959. ID, news at 2002 into commentary. Abruptly off at 2018 during English talk 9525.98, 1215-1300 listed as Japanse service (Alexander).

1235 UTC on 9400
PHILIPPINES: FEBC. Extended Mandarin text to brief announcer break over music. Choral music at 1258 followed by presumed ID and talk at 1259. Fair signal at best. Freq 9430, 1300-1315 in Mandarin (Barbour). **Radio Pilipinas** 11720, 1758. Announcer's station ID at 1801 (MacKenzie).

1300 UTC on 6080
SINGAPORE: Radio Singapore International. Mentions of station website to local and UTC time checks. News headlines to *Hot Tracks* program of pop music from the UK charts. Newscast at 1330 for good signal quality. More time checks and *Singapop* program heard to 1316 (Wilkins).
On-demand and podcast **www.rsi.sg/**

1415 on 6130
LAOS: Lao National Radio. Laotian newscast to English language lesson, *Welcome to Functioning in Business* "with focus on American business practices and culture." Program included Laotian translations. Fair signal quality (Howard).
On-demand audio **www.lnr.org.la/**

1545 UTC on 13590
GERMANY: Bible Voice Broadcasting. English religious programming with *Hour of Prayer* program. ID at Monday sign-off at 1600. Fair signal but weak CVC-Zambia heard underneath Bible Voice (Alexander).
On-demand audio and podcast **www.biblevoice.org/** **IBRA Radio** via Nauen, Germany 9675, 1941-2003 (Barbour).

2215 UTC on 4904.94
CHAD: Radiodiffusion Nationale T'chadienne. Primarily French programming comments to segments of African hilife music. Station information to national anthem to 2219.* Signal good (Bolland).

2306 UTC on 5009.78
DOMINICAN REPUBLIC: Radio Pueblo. Spanish. Musical ballads to announcer's text between tunes. Several "Radio Pueblo" identifications, including a tentative ID for Radio Cristal International. Weak signal but in the clear (Barbour). **Radio Cristal Int'l** 5009.79, 2355-2359.* Breaks of Spanish music and several "Radio Cristal" identifications. Poor signal amid noisy conditions (Alexander).

2345 UTC on 13680
CUBA: Radio Nacional de Venezuela. Spanish news, station promotional, and general discussion. Piano excerpts and musical interludes (Branco). 15290, 1920 Spanish (MacKenzie).

Additional loggings, excluded for space constraints, are posted as **Blog Logs** on the **Shortwave Central Blog** at the above web address.

Thanks to our contributors – Have you sent in YOUR logs?
Send to Gayle Van Horn, c/o Monitoring Times
English broadcast unless otherwise noted.

PROGRAMMING SPOTLIGHT

WHAT'S ON WHEN AND WHERE?

Fred Waterer
fredwaterer@monitoringtimes.com
www.doghousecharlie.com/radio

Rock and Roll Music

Just let me hear some of that rock and roll music
Any old way you choose it…
…It's gotta be rock roll music
If you wanna dance with me

That's a fragment of one of my favorite songs of all time, done by many artists, but my preferred version is the one on the Beatles '65 album.

It's no secret, we all love music in one form or another. I was fortunate to grow up in a household in which many varied kinds of music were heard and enjoyed. As a result, although I cannot carry a tune to save my life, I have a deep love of all types and genres of music. I also happen to have grown up during the Rock era in the 1970s, but for some reason, I have always been drawn to the music of the late 1950s and early 1960s. My first love is early Rock and Roll and Rockabilly.

One of my "eureka" moments came when I was given my first radio at Christmas 1969. It was a little pocket transistor that I could take anywhere, and did. I turned it on for the first time and heard the guitar intro to Roy Orbison's "Pretty Woman." Later the next summer, 1050 CHUM in Toronto did an "oldies" weekend and I was exposed to Buddy Holly, Chuck Berry, Bill Halley and so many others. From these two experiences, my love of music from the era just before I was born was established.

Over the years I have gravitated to programs which play the music of this era and also provide background to the music and artists. There are a surprising number of shows via shortwave and the internet that highlight oldies rock and roll. There are also a few relatively new chart shows showing up in the schedules as well. Obviously we can't look at every show in two pages, but here are some which I believe to be well worth hearing.

❖ Old Time Rock and Roll

These aren't your "Good Times and Eight Oldies" type shows. Here you will find B sides, obscure cuts, obscure bands and loads of songs, which will leave you wondering, "Why wasn't that a hit?"

WWCR - Rock the Universe

Rich Adcock has been at the helm of this program for years. And it's a great program indeed. Rich is the self-appointed "Viceroy of Vinyl," and each week he brings you a toe tapping variety of music from the '50s and '60s with emphasis on rockabilly and doo-wop.

I've been a fan of Rich and his program for many, many years; from the first time I heard it on WWCR. He plays songs that rarely, if ever, get played anywhere else. And that's why I like this and other programs. The music is from the 1950s and 1960s, but often I am hearing a tune for the first time. So it's all "new."

Rich can be heard via WWCR, and also via the internet. The program airs on WWCR at the following times: 7490 kHz 1205 UTC Saturdays; 3215 kHz 0805 UTC Sundays; and 3215 kHz 0700 UTC Mondays. Or download it at:

http://69.93.242.138/DKOS/ (Scroll down for RTU).

WBCQ - Lost Discs Radio Show

WBCQ is home to *The Lost Discs Radio Show* on UTC Sundays at 0200 on 5110 and 7415 kHz. Their mandate is "spinning obscure oldies and B-sides that the corporate stations won't touch." A recent show in June featured the music of the late Bo Diddley, and other tracks about Bo, or with a trademark "Bo Diddley beat." Lots of humorous banter by the hosts, much of it unrelated to the music; however, the number of tunes played makes listening worthwhile. You can also listen to the program as a podcast, or download past shows from an extensive program archive. Check it out at:

http://lostdiscsradioshow.tripod.com/

CBC - Randy Bachman's Vinyl Tap

Each Saturday night, the familiar guitar solo from the opening of one of Randy's biggest hits, "Taking Care of Business," heralds the arrival of *Randy's Vinyl Tap* – one of the cooler shows on radio, in my opinion. I really like Randy's relaxed conversational style. It's almost like you are sitting around the kitchen on a Saturday night, talking music while Randy plays around with his guitar.

It's a rather innovative program, too. At times he has given guitar lessons, discussed the history of various kinds of guitars, reminisced with "behind the scenes" stories about the music business, and done retrospectives on various artists. Randy also encourages listener feedback.

The program originates in Vancouver via the CBC Radio One network, and can be heard via the CBC Northern Quebec Shortwave Service on UTC Saturdays at 2200 on 9625 kHz. The program is repeated on UTC Saturdays (Friday local time) at 0300. You can also go to **www.cbc.ca/local** and pick a location, then tune in at the appropriate local time. Also check the program website at: **www.randysvinyltap.com/main.php**

Mark LaMarr (BBC Radio 2)

Over the years, the BBC World Service was home to a number of pop and rock music programs, hosted by such luminaries as Dave Lee Travis (my personal favorite) who boasted his show was coming from the BBC Wild Service, and the late John Peel. Oddly enough, many of the best-known BBC presenters had their roots on the Radio Pirates of the 1960s. The closest they come to this genre is *The Beat*, and *Charlie Gillett's World of Music*. Not rock or pop shows, however.

Domestic BBC Radio is another story.

Mark LaMarr is a BBC television and radio presenter as well as a stand up comic (he played the Montreal Comedy Festival a few years ago). Mark hosts a number of programs on Radio 2 in the UK, and I have become a real fan.

From BBC Radio 2: "Mark has taken over Thursday evenings with his specialist music shows. This is where to find the best Reggae, Rock 'n' Roll and Alternative Sixties tunes. But not all at once!

"Each genre will run for a few weeks at a time, and you'll always be able to check here to see which show is currently on air and which one's coming next.

"And of course you'll always be able to listen again to the latest show and find full details of all the music Mark plays on the show."

My favorite LaMarr show is *Shake, Rattle and Roll*, an exploration of rockabilly and early, obscure rock and roll. This alternates with his **Reggae** show (which is okay, if you like reggae, but I just listen for Mark) and his *Alternative Sixties* show (some pretty obscure music of the sixties). It's clear he loves this music, and is extremely knowledgeable about it.

LaMarr also hosts a 3-hour program on Friday night/Saturday morning, called *God's Jukebox*. Despite the title, it is not a religious program, but promises "the best music of the last seventy years, that you didn't know you liked." You can hear anything from Ska to Rock to Country to Blues in this program. I highly recommend it. Live music in studio every week, too. You can access all of Mark's shows at

www.bbc.co.uk/radio2/shows/lamarr/

Also on Radio 2, one can hear *Sounds of the Sixties*, another favorite hosted by Brian Matthew, sometimes described as the fifth

Beatle, for his radio work with them early in their career. Brian is a treasure, who lived the music of the sixties. He was recognized recently with a lifetime achievement award at the UK Sony Radio Awards.

Each week, Brian presents two hours of favorites and listener requests from the swingin' sixties.

www.bbc.co.uk/radio2/shows/sounds60s/

Finally, I would be remiss if I didn't mention **Suzi Quatro**. Her self-titled show on Radio 2 features all sorts of great tunes, doo-wop and interviews with the people who lived it. Suzi made a nice life and career for herself in the UK and she has become a very engaging radio host.

www.bbc.co.uk/radio2/shows/quatro/

Treasure Island Oldies

Mentioned in previous columns, my favorite oldies show is *Treasure Island Oldies*. You can hear archived versions any time, or listen live and join the chatroom at 0100 UTC Mondays. It truly is the "home of lost treasures." And it may be coming to shortwave soon. "Stay tuned."

www.treasureislandoldies.com

❖ More than just Oldies...

Of course, it's not just oldies one can hear on the radio. Despite the rather amusing interview DJ Red Robinson did with Buddy Holly, indicating that Rock and Roll would last maybe another 6 months (off by 50 years and counting), lots of good new music continues to air and international broadcasters give us a chance to hear some really interesting and exotic stuff.

Polish Radio External Service – Chart Show

I stumbled across this one quite recently. It's your typical chart show, but with a twist. Many of the top tunes in Poland are played, but not the ones you hear in North America. While the Polish chart is prepared by a domestic Polish radio station/network, this particular program, at least when I heard it, stuck to the fastest climbing Polish artists (with one exception). I really enjoyed this opportunity to hear Polish music and artists I had never heard before. There are some really good ones as well.

Shortwave from Poland is difficult at the

best of times, but try UTC Saturday at the end of the 1200 UTC broadcast (7330, 9525 kHz) or UTC Sunday during the 1700 UTC broadcast (7140, 7265 kHz). Otherwise, go to the Polish Radio External Service website and listen or download the show in mp3 format.

www.polskieradio.pl/zagranica/onas/a?id=10&p=1

Voice of Russia - Russian Hits

The newest pop music program on the world bands comes from Russia. *Russian Hits* is a monthly program from the Voice of Russia hosted by (A.?) Karpov. I've heard a couple of editions of this program and find it a welcome addition to the Voice of Russia schedule. The host especially encourages listener participation via email.

The music played during the program is varied, reflecting the rather exciting music scene in Russia at the moment. I have no doubt this program was started to coincide with Dima Bilan's win at the 2008 Eurovision song contest, making Moscow host of next year's event.

The music is clearly influenced by western hits and styles, but there are some uniquely Russian influences injected into most of the music, oddly enough with the exception of Bilan's tune.

Mr. Karpov brings a great deal of enthusiasm to the program and the subject matter. His Russian accent is endearing when he uses phrases like "I dig it" (I deeg it). Once the program is established, I hope he gets a good listener response. The program is apparently monthly. Try listening mid-month at 0430 UTC Tuesday on 13775, 13635, 9860, 9665, 9435 and 9800 kHz or 0230 UTC Friday on 13775, 9860, 9665 and 9480 kHz. It's also in the mix on their internet stream. It alternates with other music shows in this time slot.

Congratulations to the Voice of Russia for introducing this new program. It's a breath of fresh air. I've always been impressed with the music from the Voice of Russia. It's just that Pop/Rock music had struggled to be heard amongst the classics and jazz and folk tunes.

And, if you want to investigate the incredible variety of music in Russia, check out Radio 101 in Moscow, online. Last time I checked there were over 40 separate music streams.

www.101.ru

Mixed Bag

Other programs mentioned in past columns are well worth a listen too. Just a few examples include:

Groove Zone from Radio Taiwan International heard UTC Saturdays, 20 minutes into the broadcast. Try 5950 kHz.

Korean Pop Interactive from KBS in Korea is heard after the news on UTC Sunday broadcasts from Seoul. Try at 1200 on 9650 kHz or 0230 on 9560, or online at

http://world.kbs.co.kr/english/entertainment/enter_bbs_list.htm

Pop Up Japan from Radio Japan can be heard at 0510 on 6110 kHz or 1210 on 6120 kHz UTC Sundays.

Hits in Germany from Deutsche Welle is hosted by Deborah Friedman and is heard on UTC Tuesdays. Try DW transmissions to Africa or via the internet

www.dw-world.de

So there you have a quick look at just a few of the oldies rock and chart shows that are out there. I leave you with the words of Billy Joel: *"Hot funk, cold punk, even if it's old junk, it's still rock and roll to me."*

THE QSL REPORT

VERIFICATIONS RECEIVED BY OUR READERS

Gayle Van Horn, W4GVH
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The lure of the lonely lighthouse

"Shine on guiding light - the sailor sees your beacon shining bright"

Lighthouses have a hypnotic effect. Even in daylight they capture our attention, and for some devotees, lighthouses are a true passion. Whether they stand watch on a river or along a rocky coastline, sailors and travelers have depended on them as a signpost to safety – and home. If you have succumbed to the lure of lighthouses, here is an opportunity to answer that call.

The *International Lighthouse and Lightship Weekend* is set to begin at 0001 UTC August 16 and close at 2359 on Sunday August 17, 2008. Although not a contest, the popular annual event is designed to promote goodwill and friendship among amateur operators and shortwave hobbyists around the world.

The *Amateur Radio Lighthouse Society* recommends the following sub bands within the five amateur radio bands for activity during the weekend event.

CW (Morse Code) MHz		Phone (Voice) MHz	
80 meters	3.510-3.540	*80 meters	3.650.3-3.750
40 meters	7.005-7.035	*40 meters	7.040-7.100
20 meters	14,010-14.040	20 meters	14.125-14.275
15 meters	21.010-21.040	15 meters	21.150-21.250
10 meters	28.010-28.040	10 meters	28.300-28.400

*U.S. operators should replace 80 and 40 meters with 3.950 and 7.250-7.290 MHz. For additional information on the *International Lighthouse and Lightship Weekend* consult **http://illw.net/** or **www.arlhs.com/** To view a video from the 2007 weekend, go to **www.youtube.com/watch?v=eiGA7F09ZM8.** This is a great opportunity to pay homage to those who have served as keepers of the light.

AMATEUR RADIO

Canada-VE3ELL, 6 meters SSB. Full data three-colored card. Received in 189 days for an SASE and $1.00US. QSL address: Russell Thomas Farrell, 39 Truax Crescent, R. R #4, Angus, ON Canada LOM 1B4 (L.Van Horn, NC)

VE4ARM (Manitoba Amateur Radio Museum) 80 meters SSB. Full data multicolored card. Received in 712 days via ARRL bureau (Van Horn)

VO2WL, 40/20/15 meters SSB. Black/white card. Received in 712 days via ARRL bureau (Van Horn).

VO1AA (IOTA NA-027) 15 meters SSB. Full data color photo folder card featuring Marconi. Received in 462 days via ARRL bureau (Van Horn).

Japan-JA2YKA, 10 meters SSB. Full data color photo card. Received in 712 days via ARRL bureau (Van Horn).

USA-N6DXX, 10 metersSSB. Power 5 watts. Full data QSL card. Received in eight days for an email report and mp3 recording. QSL address: Tony Leneis, 751 Clipper Way, Sacramento, CA 95831 (Jim Pogue, Memphis, TN).

DJIBOUTI

RD TV, 4780 kHz. Date/time notation on 8x11 verification sheet, signed as Le Chef des Services Technique. Received in 66 days for a French report. Station address: Boite Postal 97, Djibouti, Republic of Djibouti (John Wilkins, Wheat Ridge, CO)

Streaming audio and video **www.rtd.dj/**

MEDIUM WAVE

CHWO, 740 kHz AM. Station QSL card, *AM740* bookmark and brochure of the Hammond Museum and ODXA pamphlet. Received in 20 days for an AM report. QSL address: ODXA, 155 Main St., N. Apt. 313, New Market, ON Canada L3Y BC2 (Woering).

KGYN, 1210 kHz AM. Full data letter signed by Jim Smith-General Manager. Received in seven days for an AM follow-up report from 2007 and $1.00US (returned). Station address: P.O. Box 130, Guymon, OK 73942.

Streaming audio **www.kgynam1210.com/main.html**

KVOX, 740 kHz AM. *Fan 740 AM*. Business card with verification statement written on the back by Tank McNamara. Received in six days after an AM followup (86 days total). Station address: 1020 South 25th Street, Fargo, ND 58103 (Patrick Martin, Seaside, OR).

Streaming audio **www.740thefan.com/**

WGOK, 900 kHz AM. *Gospel 900*. Full data letter signed by Kevin Hanna-Assistant Engineer. Signer will QSL former WDLT 600 kHz which is now WXQW. Received in 466 days for $1.00 US. Station address: Cumulus Broadcasting Inc., 2800 Dauphin St., Suite 104, Mobile, AL 36606 (Pogue)

Streaming audio **www.gospel900.com/**

WNAU, 1470 kHz. Full data verification letter, signed by Terry Cook-General Manager. Received in 14 days after AM follow up report (410 days total), and $1.00. Station address: P.O. Box 808, New Albany, MS 38652 USA (Pogue)

RUSSIA

Voice of Russia, 9480 kHz. QSL card via St. Petersburg Regional Center. Full data St. Petersburg Regional Center-Branch card, with site notation. Received in 72 days for three IRCs and an SASE (not used). QSL address: St. Petersburg Regional Center, 2, ul. Akademika Pavlova St., St. Petersburg 197002 Russia (Frank Hillton, Greenville, SC).

Streaming audio, on-demand audio and podcast **www.ruvr.ru/index.php?lng=eng**

SÃO TOMÉ

Voice of America relay. Full data aerial view card with relay site notation, unsigned. Calendar and program brochure enclosed. Received in 20 days for an English email report to *letter@voa.gov.* (Harold Woering N1FTP, Easthampton, MA).

Streaming audio, on-demand audio and podcast **www.voanews.com/english/search.cfm**

SOUTH AFRICA

Radio Okapi via Meyerton, 9635 kHz. Full data card without site notation, signed by Amervoic Wihada. Received in 84 days for a CD recording and $2.00US. QSL address: Foundation Hirondelle, 3 Rue Traversiére, CH 1018-Lausanne, Switzerland. Website **www.radiookapi.net/**

USA

Radio Liberty via WWCR, 7465 kHz. Full data WWCR antenna farm card including comments on tuning into Radio Liberty, plus program guide. Received in 23 days for an English report and $1.00US. Station address: WWCR Shortwave, 1330 WWCR Avenue, Nashville, TN 37218 USA (Woering).

Streaming and on-demand audio **www.wwcr.com/listen.html**

UTILITY

530 kHz WQB586 Washington, (11 miles south of Chehalis). Friendly verification letter signed by Mel Pennington-Electronic Design Engineer. Noted station is seven watts with a 49 foot antenna. Station address: WADOT, P.O. Box 47300, Olympia, WA 98504-7300 USA (Martin).

Marine Coastal Radio-VMC, Charleville, Queensland, Australia 6507USB kHz. Full data e-QSL of multicolored QSL of flag from Mike Dalakis *m.dalakis@bom.gov.au* . Received in 33 days (John Wilkins, Wheat Ridge, CO)

ZAMBIA

Christian Vision Communications/The Voice-Africa, 13590 kHz. Full data card with details and printed station info, plus no-date form letter signed by George (illegible surname) and 2008 calender. received in 42 days. All reports I've seen indicate this is via Lusaka, Zambia. QSL address: P.O. Box 6361, Marochydore, QLD 4558, Australia. U.K. address: The Voice, P.O. Box 3040, West Bromwich, West Midlands B70 0EJ United Kingdom Website: **www.cvc.tv/** (Wilkins).

Streaming audio **www.cvc.tv/english/**

How to Use the Shortwave Guide

0000-0100 twhfa USA, Voice of America 5995am 6130ca 7405am 9455af

① ② ⑤ ③ ④ ⑥ ⑦

Convert your time to UTC.

Broadcast time on ① and time off ② are expressed in Coordinated Universal Time (UTC) – the time at the 0 meridian near Greenwich, England. To translate your local time into UTC, first convert your local time to 24-hour format, then add (during Daylight Saving Time) 4, 5, 6 or 7 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each hour.

Note that all *dates*, as well as times, are in UTC; for example, a show which might air at 0030 UTC *Sunday* will be heard on *Saturday* evening in America (in other words, 8:30 pm Eastern, 7:30 pm Central, etc.).

Find the station you want to hear.

Look at the page which corresponds to the time you will be listening. English broadcasts are listed by UTC time on ① , then alphabetically by country ③, followed by the station name ④. (If the station name is the same as the country, we don't repeat it, e.g., "Vanuatu, Radio" [Vanuatu].)

If a broadcast is not *daily*, the days of broadcast ⑤ will appear in the column following the time of broadcast, using the following codes:

Codes	
s/Sun	Sunday
m/Mon	Monday
t	Tuesday
w	Wednesday
h	Thursday
f	Friday
a/Sat	Saturday
occ:	occasional
DRM:	Digital Radio Mondiale
irreg	Irregular broadcasts
vl	Various languages
USB:	Upper Sideband

Choose the most promising frequencies for the time, location and conditions.

The frequencies ⑥ follow to the right of the station listing; all frequencies are listed in kilohertz (kHz). Not all listed stations will be heard from your location and virtually none of them will be heard all the time on all frequencies.

Shortwave broadcast stations change some of their frequencies at least twice a year, in April and October, to adapt to seasonal conditions. But they can also change in response to short-term conditions, interference, equipment problems, etc. Our frequency manager coordinates published station schedules with confirmations and reports from her monitoring team and *MT* readers to make the Shortwave Guide up-to-date as of one week before print deadline.

To help you find the most promising signal for your location, immediately following each frequency we've included information on the target area ⑦ of the broadcast. Signals beamed toward your area will generally be easier to hear than those beamed elsewhere, even though the latter will often still be audible.

Target Areas

af:	Africa
al:	alternate frequency (occasional use only)
am:	The Americas
as:	Asia
ca:	Central America
do:	domestic broadcast
eu:	Europe
me:	Middle East
na:	North America
pa:	Pacific
sa:	South America
va:	various

MT Monitoring Team

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Thank You …

Additional Contributors to This Month's Shortwave Guide:

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Shortwave Broadcast Bands

kHz	Meters
2300-2495	120 meters (Note 1)
3200-3400	90 meters (Note 1)
3900-3950	75 meters (Regional band, used for broadcasting in Asia only)
3950-4000	75 meters (Regional band, used for broadcasting in Asia and Europe)
4750-4995	60 meters (Note 1)
5005-5060	60 meters (Note 1)
5730-5900	49 meter NIB (Note 2)
5900-5950	49 meter WARC-92 band (Note 3)
5950-6200	49 meters
6200-6295	49 meter NIB (Note 2)
6890-6990	41 meter NIB (Note 2)
7100-7300	41 meters (Regional band, not allocated for broadcasting in the western hemisphere) (Note 4)
7300-7350	41 meter WARC-92 band (Note 3)
7350-7600	41 meter NIB (Note 2)
9250-9400	31 meter NIB (Note 2)
9400-9500	31 meter WARC-92 band (Note 3)
9500-9900	31 meters
11500-11600	25 meter NIB (Note 2)
11600-11650	25 meter WARC-92 band (Note 3)
11650-12050	25 meters
12050-12100	25 meter WARC-92 band (Note 3)
12100-12600	25 meter NIB (Note 2)
13570-13600	22 meter WARC-92 band (Note 3)
13600-13800	22 meters
13800-13870	22 meter WARC-92 band (Note 3)
15030-15100	19 meter NIB (Note 2)
15100-15600	19 meters
15600-15800	19 meter WARC-92 band (Note 3)
17480-17550	17 meter WARC-92 band (Note 3)
17550-17900	17 meters
18900-19020	15 meter WARC-92 band (Note 3)
21450-21850	13 meters
25670-26100	11 meters

Notes

Note 1 Tropical bands, 120/90/60 meters are for broadcast use only in designated tropical areas of the world.

Note 2 Broadcasters can use this frequency range on a (NIB) non-interference basis only.

Note 3 WARC-92 bands are allocated officially for use by HF broadcasting stations in 2007

Note 4 WRC-03 update. After March 29, 2009, the spectrum from 7100-7200 kHz will no longer be available for broadcast purposes and will be turned over to amateur radio operations worldwide

0000 UTC - 8PM EDT / 7PM CDT / 5PM PDT

0000	0000		UK, BBC World Service	5970as	6195as	
			7105as	9410as	9740as	11955as
			15335as	15360as	17615as	
0000	0005		Canada, R Canada International		6100na	
0000	0020		Japan, NHK World/Radio Japan		5920eu	
			6145na	13650as	17810as	
0000	0027		Czech Rep, Radio Prague	7345na	9440na	
0000	0028	mtwhfa	Serbia, International Radio Serbia		6190na	
0000	0030		Australia, HCJB Global	15525as		
0000	0030		Thailand, Radio Thailand	9680af		
0000	0030		USA, Voice of America	7555as		
0000	0045		Egypt, Radio Cairo	9280eu		
0000	0045		India, All India Radio	9705as	9950as	
			11620as	11645as	13605as	
0000	0045		USA, WYFR/Family Radio Worldwide		17805sa	
0000	0056		Romania, R Romania International		9775na	
0000	0057		Canada, R Canada International		11700as	
0000	0057		Netherlands, R Netherlands Worldwide		9845na	
0000	0100		Anguilla, Worldwide Univ Network		6090am	
0000	0100		Australia, ABC NT Alice Springs		2310do	
			4835do			
0000	0100		Australia, ABC NT Katherine	5025do		
0000	0100		Australia, ABC NT Tennant Creek		4910do	
0000	0100		Australia, Radio Australia	9660as	12080as	
			13690as	15240pa	17715as	17750va
			17775va	17795va		
0000	0100		Canada, CFVP Calgary AB	6030na		
0000	0100		Canada, CKZN St John's NF	6160na		
0000	0100		Canada, CKZU Vancouver BC		6160na	
0000	0100		China, China Radio International		6020na	
			6075as	6180as	7130eu	9570na
			11885as	13750as	15125as	
0000	0100		Costa Rica, Worldwide Univ Network		5030va	
			6150va	7375va	9725va	
0000	0100		Germany, Deutsche Welle	9885as	15595as	
			17525as			
0000	0100		Guyana, Voice of Guyana	3291do		
0000	0100		Malaysia, RTM/Traxx FM	7295as		
0000	0100	DRM	New Zealand, Radio NZ International		13730pa	
0000	0100		New Zealand, Radio NZ International		15720pa	
0000	0100	vl	Papua New Guinea, Wantok R. Light		7325va	
0000	0100		Spain, Radio Exterior Espana	6055na		
0000	0100		Ukraine, R Ukraine International		7440na	
0000	0100		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7811usb	10320usb
			12132usb	13362usb		
0000	0100	Sat	USA, WBCQ Monticello ME	15420am	17495am	
0000	0100		USA, WBCQ Monticello ME	5110am	7415am	
			9330am			
0000	0100		USA, WBOH Newport NC	5920am		
0000	0100		USA, WEWN Vandiver AL	11520me		
0000	0100		USA, WHRA Greenbush ME	5850eu		
0000	0100		USA, WHRI Cypress Creek SC		5875na	
			7385na			
0000	0100		USA, WINB Red Lion PA	9265am		
0000	0100		USA, WRMI Miami FL	9955am		
0000	0100		USA, WTJC Newport NC	9370na		
0000	0100		USA, WWCR Nashville TN	5070na	5935na	
			7465na	9980na		
0000	0100		USA, WWRB Manchester TN	3185va	5050va	
			5745va	6180va		
0000	0100		USA, WYFR/Family Radio Worldwide		6985na	
			9505na	11835ca		
0000	0100		Zambia CVC Intl/Christian Voice		4965af	
0005	0057	twhfa	Canada, R Canada International		6100na	
0030	0045	twhfas	Albania, Radio Tirana	9390na		
0030	0045	Sun	Germany, Pan American BC	9640as		
0030	0100		Australia, Radio Australia	15415as		
0030	0100		China, China Radio International		11730as	
0030	0100		Lithuania, Radio Vilnius	11690na		
0030	0100		Thailand, Radio Thailand	12120na		
0030	0100	fas	UK, Bible Voice BC	9490as		
0030	0100		USA, Voice of America	9715va	9780va	
			11725va	15185va	15205va	15290va
			15560va	17820va		

0100 UTC - 9PM EDT / 8PM CDT / 6PM PDT

0100	0105	twhfa	Canada, R Canada International		6100na	
0100	0127		China, China Radio International		11730as	
0100	0127		Czech Rep, Radio Prague	6200na	7345na	
0100	0127		Slovakia, R Slovakia International		5930na	
			9440sa			
0100	0128		Serbia, International Radio Serbia		6190na	
0100	0128		Vietnam, Voice of Vietnam	6175na		
0100	0130		Australia, Radio Australia	17775as		
0100	0155		Turkey, Voice of Turkey	9620am		
0100	0157		China, China Radio International		6020na	
			6175as	9470eu	9535as	9570na
			9580na	9790na	11870as	
0100	0157		Netherlands, R Netherlands Worldwide		9845na	
0100	0158	DRM	New Zealand, Radio NZ International		13730pa	
0100	0159		Canada, R Canada International		9620as	
0100	0200		Anguilla, Worldwide Univ Network		6090am	
0100	0200		Australia, ABC NT Katherine	5025do		
0100	0200		Australia, ABC NT Tennant Creek		4910do	
0100	0200		Australia, Radio Australia	9660as	12080as	
			13690as	15240pa	15415as	17715as
			17795va			
0100	0200		Canada, CFVP Calgary AB	6030na		
0100	0200		Canada, CKZN St John's NF	6160na		
0100	0200		Canada, CKZU Vancouver BC		6160na	
0100	0200		Costa Rica, Worldwide Univ Network		5030va	
			6150va	7375va	9725va	
0100	0200		Cuba, Radio Havana Cuba	6000na	6180na	
0100	0200		Guyana, Voice of Guyana	3291do		
0100	0200		Indonesia, Voice of Indonesia	9525al	11785pa	
			15150as			
0100	0200		Malaysia, RTM/Traxx FM	7295as		
0100	0200		New Zealand, Radio NZ International		15720pa	
0100	0200		North Korea, Voice of Korea	4405as	7140as	
			9345as	9730as	11735am	12760am
			15180am			
0100	0200	vl	Papua New Guinea, Wantok R. Light		7325va	
0100	0200		Russia, Voice of Russia	7250na	9665na	
			13755na	15425na		
0100	0200		Sri Lanka, SLBC	6005as	9770as	15745as
0100	0200		Taiwan, R Taiwan International		11875as	
0100	0200		UK, BBC World Service	7320as	9410as	
			9740as	11750as	11955as	15310as
			15335as	15360as	17615as	
0100	0200		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
0100	0200		USA, KWHR Naalehu HI	17800as		
0100	0200		USA, Voice of America	7430va	9780va	
			11705as			
0100	0200		USA, WBCQ Monticello ME	5110am	7415am	
			9330am			
0100	0200		USA, WBOH Newport NC	5920am		
0100	0200		USA, WEWN Vandiver AL	11520me		
0100	0200		USA, WHRA Greenbush ME	5850eu		
0100	0200		USA, WHRI Cypress Creek SC		7385na	
0100	0200		USA, WINB Red Lion PA	9265am		
0100	0200		USA, WRMI Miami FL	9955am		
0100	0200		USA, WTJC Newport NC	9370na		
0100	0200		USA, WWCR Nashville TN	5070na	5935na	
			7465na	9980na		
0100	0200		USA, WWRB Manchester TN	3185va	5050va	
			5745va	6180va		
0100	0200		USA, WWRB Manchester TN	3185va	5050va	
			5745va	6180va		
0100	0200		USA, WYFR/Family Radio Worldwide		6985na	
			9505na	15195as		
0100	0200		Uzbekistan, CVC International		11790as	
0100	0200		Zambia, CVC Intl/Christian Voice		4965af	
0130	0200		Iran, Voice of the Islamic Rep of Iran		7235na	
			9495na			
0130	0200		Sweden, Radio Sweden	6010na		
0130	0200	twhfa	USA, Voice of America	6040va	9820va	
0140	0200		Vatican City, Vatican Radio	9650na		
0145	0200	twhfas	Albania, Radio Tirana	9390na		

0200 UTC - 10PM EDT / 9PM CDT / 7PM PDT

0200	0227		Iran, Voice of the Islamic Rep of Iran		7235na	
			9495na			
0200	0230		South Korea, KBS World Radio		9580sa	
0200	0230		Thailand, Radio Thailand	15275na		
0200	0245		USA, WYFR/Family Radio Worldwide		11835ca	
0200	0257		China, China Radio International		11770as	
			13640as			
0200	0258	DRM	New Zealand, Radio NZ International		13730pa	
0200	0259	Sun	Lithuania, Mighty KBC Radio	6055na		
0200	0300		Anguilla, Worldwide Univ Network		6090am	
0200	0300	mtwhf	Argentina, RAE	11710am		
0200	0300		Australia, ABC NT Alice Springs		2310do	
			4835do			
0200	0300		Australia, ABC NT Katherine	5025do		
0200	0300		Australia, ABC NT Tennant Creek		4910do	
0200	0300		Australia, Radio Australia	9660as	12080as	
			13690as	15240pa	15415as	15515as
			17750va	21725va		
0200	0300		Bulgaria, Radio Bulgaria	9700na	11700na	
0200	0300		Canada, CFVP Calgary AB	6030na		

0200	0300		Canada, CKZN St John's NF	6160na		
0200	0300		Canada, CKZU Vancouver BC	6160na		
0200	0300		Costa Rica, Worldwide Univ Network	5030va		
			6150va	7375va	9725va	
0200	0300		Cuba, Radio Havana Cuba	6000na	6180na	
0200	0300		Egypt, Radio Cairo	7270na		
0200	0300		Guyana, Voice of Guyana	3291do		
0200	0300		Malaysia, RTM/Traxx FM	7295as		
0200	0300		New Zealand, Radio NZ International	15720pa		
0200	0300		North Korea, Voice of Korea	3560as	13650as	
			15100as			
0200	0300	vl	Papua New Guinea, Wantok R. Light	7325va		
0200	0300		Philippines, Radio Pilipinas	12025va	15285va	
			17770va			
0200	0300		Russia, Voice of Russia	9480na	9665na	
			9860na	13635na	15425na	
0200	0300		Sri Lanka, SLBC 6005as	9770as	15745as	
0200	0300		Taiwan, R Taiwan International	5950na		
			9680na			
0200	0300		UK, BBC World Service	6035af	6195as	
			9410va	11955as	15310as	
0200	0300		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
0200	0300		USA, KJES Vado NM	7555na		
0200	0300		USA, KJES Vado NM	7555na		
0200	0300		USA, KWHR Naalehu HI	17800as		
0200	0300		USA, WBCQ Monticello ME	5110am	7415am	
			9330am			
0200	0300		USA, WBOH Newport NC	5920am		
0200	0300		USA, WEWN Vandiver AL	11520me		
0200	0300		USA, WHRA Greenbush ME	5850eu		
0200	0300		USA, WHRI Cypress Creek SC	5875na		
			7385na			
0200	0300		USA, WINB Red Lion PA	9265am		
0200	0300		USA, WRMI Miami FL	9955am		
0200	0300		USA, WTJC Newport NC	9370na		
0200	0300		USA, WWCR Nashville TN	3215na	5070na	
			5890na	5935na		
0200	0300		USA, WWRB Manchester TN	3185va	5050va	
			5745va	6180va		
0200	0300		USA, WYFR/Family Radio Worldwide	5985am		
			6985na	9505na	11855am	
0200	0300		Uzbekistan, CVC International	11790as		
0200	0300		Zambia, CVC Intl/Christian Voice	4965af		
0215	0230		Nepal, Radio Nepal	5005as		
0230	0257		China, China Radio International	15435me		
0230	0258		Vietnam, Voice of Vietnam	6175ca		
0230	0300	twhfas	Albania, Radio Tirana	7425na		
0230	0300		Netherlands, R Netherlands Worldwide	11550as		
0230	0300		South Korea, KBS World Radio	9560na		
0230	0300		Sweden, Radio Sweden	6010na	11550va	
0245	0300		Myanmar, Myanma Radio	9730do		
0250	0300		Vatican City, Vatican Radio	6040na	7305na	
0255	0300	vl	Rwanda, Radio Rwanda	6055do		
0259	0300	DRM	New Zealand, Radio NZ International	11675pa		

0300 UTC - 11PM EDT / 10PM CDT / 8PM PDT

0300	0315	vl	Croatia, Croatian Radio	9925na		
0300	0319		Vatican City, Vatican Radio	6040na	7305na	
0300	0327		Czech Rep, Radio Prague	7345na	9870na	
0300	0327		Vatican City, Vatican Radio	7360af	9660af	
0300	0330		Egypt, Radio Cairo	7270na		
0300	0330		Myanmar, Myanma Radio	9730do		
0300	0330		Philippines, Radio Pilipinas	12025va	15285va	
			17770va			
0300	0330		Sri Lanka, SLBC 6005as	9770as	15745as	
0300	0330	Sun	Swaziland, Trans World Radio	3200af		
0300	0330	mtwhf	UK, Sudan Radio Service	5975af		
0300	0330		USA, KJES Vado NM	7555na		
0300	0330		USA, WBCQ Monticello ME	5110am	7415am	
			9330am			
0300	0355		South Africa, Channel Africa	3345af	6135af	
0300	0355		Turkey, Voice of Turkey	5975am	7265va	
			7325na			
0300	0356		Romania, R Romania International	6150na		
			9645na	9735as	11895as	
0300	0357		China, China Radio International	9690na		
			9790na	15110as	11770as	13750as
			15120as	15785as		
0300	0400		Anguilla, Worldwide Univ Network	6090am		
0300	0400		Australia, ABC NT Alice Springs	2310do		
			4835do			
0300	0400		Australia, ABC NT Katherine	5025do		
0300	0400		Australia, ABC NT Tennant Creek	4910do		
0300	0400		Australia, Radio Australia	9660as	12080as	
			13690as	15240pa	15415as	15515as
			17750va	21725va		
0300	0400	twhfas	Canada, CBC NQ SW Service	9625na		
0300	0400		Canada, CFVP Calgary AB	6030na		
0300	0400		Canada, CKZN St John's NF	6160na		
0300	0400		Canada, CKZU Vancouver BC	6160na		
0300	0400		Costa Rica, Worldwide Univ Network	5030va		
			6150va	7375va	9725va	
0300	0400		Cuba, Radio Havana Cuba	6000na	6180na	
0300	0400		Germany, Deutsche Welle	13770as	15595as	
0300	0400		Guyana, Voice of Guyana	3291do		
0300	0400		Malaysia, RTM/Traxx FM	7295as		
0300	0400		Malaysia, RTM/Voice of Malaysia	6175as		
			9750as	15295as		
0300	0400		Netherlands, R Netherlands Worldwide	6165na		
0300	0400		New Zealand, Radio NZ International	15720pa		
0300	0400	DRM	New Zealand, Radio NZ International	11675pa		
0300	0400		North Korea, Voice of Korea	4405as	7140as	
			9345as	9730as		
0300	0400		Oman, Radio Oman	15355as		
0300	0400	vl	Papua New Guinea, Wantok R. Light	7325va		
0300	0400		Russia, Voice of Russia	5900na	9800na	
			9435na	9480na	9665na	9860na
			12065na	15735as		
0300	0400	vl	Rwanda, Radio Rwanda	6055do		
0300	0400		Taiwan, R Taiwan International	5950na		
			15215sa	15320as		
0300	0400		UK, BBC World Service	3255af	6005af	
			6145af	6190af	6195as	7160af
			9410va	9750af	12035af	15360as
			15310as	17790as		
0300	0400		Ukraine, R Ukraine International	7440na		
0300	0400		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
0300	0400		USA, KWHR Naalehu HI	17800as		
0300	0400		USA, Voice of America	4930af	6080af	
			9885af	12085af	15580af	
0300	0400		USA, WBOH Newport NC	5920am		
0300	0400		USA, WEWN Vandiver AL	11520me		
0300	0400		USA, WHRA Greenbush ME	5850eu		
0300	0400	mtwhf	USA, WHRI Cypress Creek SC	6110na		
0300	0400	Sat/Sun	USA, WHRI Cypress Creek SC	7385am		
0300	0400		USA, WHRI Cypress Creek SC	5875na		
0300	0400		USA, WRMI Miami FL	9955am		
0300	0400		USA, WTJC Newport NC	9370na		
0300	0400		USA, WWCR Nashville TN	3215na	5070na	
			5890na	5935na		
0300	0400		USA, WWRB Manchester TN	3185va	5050va	
			5745va	6180va		
0300	0400		USA, WYFR/Family Radio Worldwide	6085na		
			9505na	11740sa	15255sa	
0300	0400		Uzbekistan, CVC International	13680as		
			15515as			
0300	0400		Zambia, CVC Intl/Christian Voice	4965af		
0330	0357		Czech Rep, Radio Prague	6080na	9445as	
			11600as			
0330	0358		Vietnam, Voice of Vietnam	6175ca		
0330	0400	twhfas	Albania, Radio Tirana	7425na		
0330	0400		UK, BBC World Service	11945af		

0400 UTC - 12AM EDT / 11PM CDT / 9PM PDT

0400	0430	mtwhf	France, Radio France International	9805af		
			11995af			
0400	0430		Netherlands, R Netherlands Worldwide	9575af		
0400	0430		USA, KWHR Naalehu HI	17800as		
0400	0430		USA, Voice of America	4930af	4960af	
			6080af	9575af	11835af	12080af
			15580af			
0400	0430		USA, WWRB Manchester TN	3185va		
0400	0445		USA, WYFR/Family Radio Worldwide	6985na		
			9505na			
0400	0457		China, China Radio International	6020na		
			6080as	13750as	15120as	15785as
			17730as	17855as		
0400	0457		Netherlands, R Netherlands Worldwide	6165na		
0400	0458		New Zealand, Radio NZ International	15720pa		
0400	0458	DRM	New Zealand, Radio NZ International	11675pa		
0400	0459		South Africa, Channel Africa	3345af		
0400	0500		Anguilla, Worldwide Univ Network	6090am		
0400	0500		Australia, ABC NT Alice Springs	2310do		
			4835do			
0400	0500		Australia, ABC NT Katherine	5025do		
0400	0500		Australia, ABC NT Tennant Creek	4910do		
0400	0500		Australia, Radio Australia	9660as	12080as	
			13690as	15240pa	15415as	17750va
			21725va			
0400	0500	twhfas	Canada, CBC NQ SW Service	9625na		
0400	0500		Canada, CKZN St John's NF	6160na		
0400	0500		Canada, CKZU Vancouver BC	6160na		

0400	0500		Costa Rica, Worldwide Univ Network			5030va
			6150va	7375va	9725va	
0400	0500		Cuba, Radio Havana Cuba	6000na		6180na
0400	0500		Germany, Deutsche Welle	7225af		7245af
			12045af	15445af		
0400	0500		Guyana, Voice of Guyana	3291do		
0400	0500		Malaysia, RTM/Traxx FM	7295as		
0400	0500		Malaysia, RTM/Voice of Malaysia			6175as
			9750as	15295as		
0400	0500		Netherlands, R Netherlands Worldwide			12080af
0400	0500	vl	Papua New Guinea, Wantok R. Light			7325va
0400	0500		Russia, Voice of Russia	5900na		9800na
			9665na	9860na	13635na	15735as
0400	0500	vl	Rwanda, Radio Rwanda	6055do		
0400	0500	vl	Uganda, UBC Radio	4976do		5026do
0400	0500	DRM	UK, BBC World Service	5875eu		
0400	0500		UK, BBC World Service	3255af		6005af
			6190af	6195va	7120af	7160af
			11945af	12035va	12095as	15360as
			15565va	17790as		
0400	0500		USA, American Forces Radio	4319usb		5446usb
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
0400	0500	mtwhfa	USA, WBCQ Monticello ME	7415am		
0400	0500		USA, WBOH Newport NC	5920am		
0400	0500		USA, WEWN Vandiver AL	11520me		
0400	0500		USA, WHRA Greenbush ME	5850eu		
0400	0500		USA, WHRI Cypress Creek SC			5875am
			7365am			
0400	0500		USA, WRMI Miami FL	9955am		
0400	0500		USA, WTJC Newport NC	9370na		
0400	0500		USA, WWCR Nashville TN	3215na		5070na
			5890na	5935na		
0400	0500		USA, WWRB Manchester TN	3185va		
0400	0500		USA, WYFR/Family Radio Worldwide			6915na
			7780va	9715ca		
0400	0500		Uzbekistan, CVC International			13680as
			15515as			
0400	0500		Zambia, CVC Intl/Christian Voice			4965af
0430	0500		Australia, Radio Australia	15415as		
0430	0500	mtwh	Italy, IRRS	5990va		
0430	0500		Nigeria, Radio Nigeria/Kaduna			6090do
0430	0500	mtwhf	Swaziland, Trans World Radio			3200af
			4775af			
0459	0500		New Zealand, Radio NZ International			9615pa
0459	0500	DRM	New Zealand, Radio NZ International			9890pa

0500 UTC - 1AM EDT / 12AM CDT / 10PM PDT

0500	0507	twhfas	Canada, CBC NQ SW Service	9625na		
0500	0527		Vatican City, Vatican Radio	9660af		11625af
			13765af			
0500	0529	`	Vatican City, Vatican Radio	5965eu		7250eu
0500	0530	mtwhf	France, Radio France International			13680af
			15160af			
0500	0530		Germany, Deutsche Welle	9700af		9825me
0500	0530		Japan, NHK World/Radio Japan			5975eu
			6110na	11970af	15325as	17810as
0500	0555		South Africa, Channel Africa	7230af		9735af
0500	0557		China, China Radio International			6020na
			6190na	11880as	15350as	15465as
			17505me	17730as	17855as	
0500	0600		Anguilla, Worldwide Univ Network			6090am
0500	0600		Australia, ABC NT Alice Springs			2310do
			4835do			
0500	0600		Australia, ABC NT Katherine	5025do		
0500	0600		Australia, ABC NT Tennant Creek			4910do
0500	0600		Australia, Radio Australia	9660as		12080as
			13630as	13690pa	15160as	15240pa
			17750va			
0500	0600		Bhutan, Bhutan Broadcasting Svc			6035as
0500	0600		Canada, CKZN St John's NF	6160na		
0500	0600		Canada, CKZU Vancouver BC			6160na
0500	0600		Costa Rica, Worldwide Univ Network			5030va
			6150va	7375va	9725va	
0500	0600		Cuba, Radio Havana Cuba	6000na		6060na
			6180na	9550na	11760am	
0500	0600		Guyana, Voice of Guyana	3291do		
0500	0600		Kuwait, Radio Kuwait	15110me		
0500	0600		Malaysia, RTM/Traxx FM	7295as		
0500	0600		Malaysia, RTM/Voice of Malaysia			6175as
			9750as	15295as		
0500	0600		New Zealand, Radio NZ International			9615pa
0500	0600	DRM	New Zealand, Radio NZ International			9890pa
0500	0600		Nigeria, Radio Nigeria/Kaduna			4770do
0500	0600	vl	Papua New Guinea, Wantok R. Light			7325va
0500	0600		Russia, Voice of Russia	17635pa		21790pa
0500	0600		Swaziland, Trans World Radio			3200af
0500	0600		Swaziland, Trans World Radio			4775af
			6120af	9500af		
0500	0600	vl	Uganda, UBC Radio	4976do		5026do
0500	0600		UK, BBC World Service	3255af		6005af
			6190af	6195va	7120af	7160af
			9410va	11945af	12095as	15310as
			15360as	15420af	15565va	17640af
			17790as			
0500	0600	DRM	UK, BBC World Service	6195af		
0500	0600		Ukraine, R Ukraine International			9945eu
0500	0600		USA, American Forces Radio	4319usb		5446usb
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
0500	0600		USA, KWHR Naalehu HI	11565as		13650as
0500	0600		USA, Voice of America	4930af		6080af
			6180af	12080af	15580af	
0500	0600		USA, WBCQ Monticello ME	5110am		
0500	0600		USA, WBOH Newport NC	5920am		
0500	0600		USA, WEWN Vandiver AL	11520me		
0500	0600	Sat/Sun	USA, WHRA Greenbush ME	7490va		
0500	0600		USA, WHRI Cypress Creek SC			5875am
			7365am			
0500	0600		USA, WRMI Miami FL	9955am		
0500	0600		USA, WTJC Newport NC	9370na		
0500	0600		USA, WWCR Nashville TN	3215na		5070na
			5890na	5935na		
0500	0600		USA, WWRB Manchester TN	3185va		
0500	0600		USA, WYFR/Family Radio Worldwide			6915na
			9355va			
0500	0600		Uzbekistan, CVC International			13680as
			15515as			
0500	0600		Zambia, CVC Intl/Christian Voice			4965af
			9430af			
0515	0530	vl	Rwanda, Radio Rwanda	6055do		
0530	0556		Romania, R Romania International			9655eu
			11830eu	15435pa	17770pa	
0530	0600		Australia, Radio Australia	15415as		
0530	0600	vl	Rwanda, Radio Rwanda	6055do		
0530	0600		Thailand, Radio Thailand	17655va		
0530	0600	mtwhf	UK, Sudan Radio Service	9525af		13720af

0600 UTC - 2AM EDT / 1AM CDT / 11PM PDT

0600	0600		USA, WHRI Cypress Creek SC			5875am
			7365am			
0600	0615	Sat/Sun	South Africa, Trans World Radio			11640af
0600	0630	mtwhf	France, Radio France International			11725af
			15160af	17800af	17800af	
0600	0630		Germany, Deutsche Welle	7310af		15275af
0600	0630		Nigeria, Radio, National Svc/Abuja			7275do
0600	0645	mtwhf	South Africa, Trans World Radio			11640af
0600	0655		South Africa, Channel Africa	7230af		15255af
0600	0657		China, China Radio International			11710af
			11870me	11880as	13660as	15140me
			15350as	15465as	17505va	17540as
			17710as			
0600	0658		New Zealand, Radio NZ International			9615pa
0600	0658	DRM	New Zealand, Radio NZ International			9890pa
0600	0700		Anguilla, Worldwide Univ Network			6090am
0600	0700		Australia, ABC NT Alice Springs			2310do
			4835do			
0600	0700		Australia, ABC NT Katherine	5025do		
0600	0700		Australia, ABC NT Tennant Creek			4910do
0600	0700		Australia, CVC International	15335as		
0600	0700	Sat/Sun	Australia, Radio Australia	15415as		
0600	0700		Australia, Radio Australia	9660as		12080as
			13630as	13690as	15160as	15240pa
			15415as	15515pa	17750va	
0600	0700		Canada, CFVP Calgary AB	6030na		
0600	0700		Canada, CKZN St John's NF	6160na		
0600	0700		Canada, CKZU Vancouver BC			6160na
0600	0700		Costa Rica, Worldwide Univ Network			5030va
			6150va	7375va	9725va	11870va
0600	0700		Cuba, Radio Havana Cuba	6000na		6060va
			6180na	9550na	11760na	
0600	0700		Guyana, Voice of Guyana	3291do		
0600	0700		Kuwait, Radio Kuwait	15110me		
0600	0700		Malaysia, RTM/Traxx FM	7295as		
0600	0700		Malaysia, RTM/Voice of Malaysia			6175as
			9750as	15295as		
0600	0700		Nigeria, Radio Nigeria/Kaduna			4770do
0600	0700	vl	Papua New Guinea, Wantok R. Light			7325va
0600	0700		Russia, Voice of Russia	17635pa		21790pa
0600	0700		Swaziland, Trans World Radio			4775af
			6120af	9500af		
0600	0700		UK, BBC World Service	6005af		6190af
			6195va	9860af	11765af	12095as
			13820af	15310as	15400af	17640af
			17790as			
0600	0700	Sat/Sun	UK, BBC World Service	15420af		

0600	0700	DRM	UK, BBC World Service	6195af		
0600	0700		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
0600	0700		USA, KWHR Naalehu HI	11565as	13650as	
0600	0700		USA, Voice of America	6080af	12080af	
			15580af			
0600	0700		USA, WBCQ Monticello ME	5110am		
0600	0700		USA, WBOH Newport NC	5920am		
0600	0700		USA, WEWN Vandiver AL	7570eu		
0600	0700	Sat/Sun	USA, WHRA Greenbush ME	7490va		
0600	0700		USA, WRMI Miami FL	9955am		
0600	0700		USA, WTJC Newport NC	9370na		
0600	0700		USA, WWCR Nashville TN	3215na	5070na	
			5890na	5935na		
0600	0700		USA, WWRB Manchester TN	3185va		
0600	0700		USA, WYFR/Family Radio Worldwide		5850na	
			7520va	9680na	11530af	11580va
0600	0700		Uzbekistan, CVC International		15515as	
0600	0700	vl	Vanuatu, Radio Vanatu	7260do		
0600	0700		Zambia, CVC Intl/Christian Voice		6065af	
			13590af			
0630	0644	mtwhfa	Vatican City, Vatican Radio	5965eu	7250eu	
			9645eu	11740eu	15595eu	
0630	0700		Bulgaria, Radio Bulgaria	7200na	9400eu	
0630	0700		Vatican City, Vatican Radio	11625af	13765af	
			15570af			
0645	0700	Sun	Germany, Trans World Radio Europe		6105eu	
0645	0700	Sun	Monaco, Trans World Radio Europe		9800eu	
0659	0700		New Zealand, Radio NZ International		7145pa	
0659	0700	DRM	New Zealand, Radio NZ International		6170pa	

0700 UTC - 3AM EDT / 2AM CDT / 12AM PDT

0700	0703	vl	Croatia, Croatian Radio	11690pa		
0700	0706		UK, BBC World Service	6005af		
0700	0727		Czech Rep, Radio Prague	9880eu	11600eu	
0700	0727		Slovakia, R Slovakia International		9440pa	
			11650pa			
0700	0730		France, Radio France International		13675af	
0700	0730	mtwhf	UK, BBC World Service	15575as		
0700	0745		USA, WYFR/Family Radio Worldwide		7520va	
0700	0750	mtwhf	Germany, Trans World Radio Europe		6105eu	
0700	0750	mtwhf	Monaco, Trans World Radio Europe		9800eu	
0700	0757		China, China Radio International		11880as	
			13660as	13710eu	15350as	15465as
			17490eu	17540as	17710as	
0700	0800		Anguilla, Worldwide Univ Network		6090am	
0700	0800		Australia, ABC NT Alice Springs		2310do	
			4835do			
0700	0800		Australia, ABC NT Katherine	5025do		
0700	0800		Australia, ABC NT Tennant Creek		4910do	
0700	0800		Australia, CVC International	15335as		
0700	0800		Australia, Radio Australia	9475as	9660as	
			9710as	13630pa	15160as	15240pa
			15415as	17750va		
0700	0800		Bhutan, Bhutan Broadcasting Svc		6035as	
0700	0800		Canada, CFVP Calgary AB	6030na		
0700	0800		Canada, CKZN St John's NF	6160na		
0700	0800		Canada, CKZU Vancouver BC		6160na	
0700	0800		Costa Rica, Worldwide Univ Network		5030va	
			6150va	7375va	9725va	11870va
0700	0800	Sun	Germany, Trans World Radio Europe		6105eu	
0700	0800		Guyana, Voice of Guyana	3291do	5950do	
0700	0800		Kuwait, Radio Kuwait	15110me		
0700	0800	Sat	Latvia, Radio SWH	9290eu		
0700	0800		Liberia, Star Radio	9525af		
0700	0800		Malaysia, RTM/Traxx FM	7295as		
0700	0800		Malaysia, RTM/Voice of Malaysia		6175as	
			9750as	15295as		
0700	0800	Sun	Monaco, Trans World Radio Europe		9800eu	
0700	0800		Myanmar, Myanma Radio	9730do		
0700	0800		New Zealand, Radio NZ International		7145pa	
0700	0800	DRM	New Zealand, Radio NZ International		6170pa	
0700	0800		Nigeria, Radio Nigeria/Kaduna		4770do	
0700	0800	vl	Papua New Guinea, R East New Britain		3385do	
0700	0800	vl	Papua New Guinea, Wantok R. Light		7325va	
0700	0800		Russia, Voice of Russia	17495af	17635af	
0700	0800	vl	Solomon Islands, SIBC	5020do		
0700	0800		South Africa, Channel Africa	7230af		
0700	0800		Swaziland, Trans World Radio		4775af	
			6120af	9500af		
0700	0800		Taiwan, R Taiwan International		5950na	
0700	0800	Sat/Sun	UK, BBC World Service	15400af	15420af	
			15575as			
0700	0800		UK, BBC World Service	6190af	9860af	
			11760me	13820af	15310as	17790as
			17830af			
0700	0800	mtwhf	UK, BBC World Service	15400af		
0700	0800	Sat/Sun	UK, Bible Voice BC	5945eu		
0700	0800		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
0700	0800		USA, KWHR Naalehu HI	11565as	13650as	
0700	0800		USA, WBCQ Monticello ME	5110am		
0700	0800		USA, WBOH Newport NC	5920am		
0700	0800		USA, WEWN Vandiver AL	7570eu		
0700	0800	mtwhf	USA, WHRI Cypress Creek SC		11565am	
0700	0800		USA, WHRI Cypress Creek SC		7385na	
0700	0800	Sat/Sun	USA, WHRI Cypress Creek SC		5875va	
0700	0800		USA, WRMI Miami FL	9955am		
0700	0800		USA, WTJC Newport NC	9370na		
0700	0800		USA, WWCR Nashville TN	3215na	5070na	
			5890na	5935na		
0700	0800		USA, WWRB Manchester TN	3185va		
0700	0800		USA, WYFR/Family Radio Worldwide		5985na	
			6915na	9505na	9715na	9930af
0700	0800		Uzbekistan, CVC International		15515as	
0700	0800	vl	Vanuatu, Radio Vanatu	7260do		
0700	0800		Zambia, CVC Intl/Christian Voice		6065af	
			13590af			
0715	0750	Sat	Germany, Trans World Radio Europe		6105eu	
0715	0750	Sat	Monaco, Trans World Radio Europe		9800eu	
0745	0800	f	UK, Bible Voice BC	5945eu		

0800 UTC - 4AM EDT / 3AM CDT / 1AM PDT

0800	0815	Sat	Guam, KTWR/Trans World Radio		11840pa	
0800	0815	Sat/Sun	UK, Bible Voice BC	5945eu		
0800	0820	Sun	Germany, Trans World Radio Europe		6105eu	
0800	0820	Sun	Monaco, Trans World Radio Europe		9800eu	
0800	0825		Malaysia, RTM/Voice of Malaysia		6175as	
			9750as	15295as		
0800	0830		Australia, ABC NT Katherine	5025do		
0800	0830		Australia, ABC NT Tennant Creek		4910do	
0800	0830		Myanmar, Myanma Radio	9730do		
0800	0835	mtwhf	Guam, KTWR/Trans World Radio		11840pa	
0800	0845		USA, WYFR/Family Radio Worldwide		5950ca	
			9930af			
0800	0857		China, China Radio International		11620as	
			11880as	13710eu	15350as	15465as
			17490eu	17540as		
0800	0900		Anguilla, Worldwide Univ Network		6090am	
0800	0900		Australia, ABC NT Alice Springs		2310do	
			4835do			
0800	0900		Australia, CVC International	15335as		
0800	0900		Australia, Radio Australia	9475as	9580va	
			9590va	9710as	12080pa	13630as
			15415as	17750va		
0800	0900		Bhutan, Bhutan Broadcasting Svc		6035as	
0800	0900		Canada, CFVP Calgary AB	6030na		
0800	0900		Canada, CKZN St John's NF	6160na		
0800	0900		Canada, CKZU Vancouver BC		6160na	
0800	0900		Costa Rica, Worldwide Univ Network		5030va	
			6150va	7375va	9725va	11870va
0800	0900	DRM	Germany, Deutsche Welle	12005as		
0800	0900		Guyana, Voice of Guyana	3291do	5950do	
0800	0900		Indonesia, Voice of Indonesia	9525al	11785pa	
			15150as			
0800	0900		Malaysia, RTM/Traxx FM	7295as		
0800	0900		New Zealand, Radio NZ International		7145pa	
0800	0900	DRM	New Zealand, Radio NZ International		6170pa	
0800	0900		Nigeria, Radio Nigeria/Kaduna		4770do	
0800	0900		Nigeria, Voice of Nigeria/Lagos		9690af	
0800	0900	vl	Papua New Guinea, R East New Britain		3385do	
0800	0900	vl	Papua New Guinea, Wantok R. Light		7325va	
0800	0900		Russia, Voice of Russia	17495af	17635af	
0800	0900	DRM	Russia, Voice of Russia	12060eu	15545eu	
0800	0900	vl	Solomon Islands, SIBC	5020do		
0800	0900		South Africa, Channel Africa	9625af		
0800	0900	Sun	South Africa, SA Radio League		7205af	
			17570af			
0800	0900		South Korea, KBS World Radio		9570as	
0800	0900		Swaziland, Trans World Radio		4775af	
			6120af	9500af		
0800	0900		UK, BBC World Service	6190af	9860af	
			11760me	15310as	15400af	17640as
			17790af	17830af	21470af	
0800	0900	Sat/Sun	UK, BBC World Service	15575as		
0800	0900		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
0800	0900		USA, KNLS Anchor Point AK	7355as		
0800	0900		USA, KWHR Naalehu HI	9930as	11565as	
0800	0900		USA, WBCQ Monticello ME	5110am		
0800	0900		USA, WBOH Newport NC	5920am		
0800	0900		USA, WEWN Vandiver AL	9355as		
0800	0900		USA, WHRI Cypress Creek SC		7385am	

0800	0900	mtwhf	USA, WHRI Cypress Creek SC	11565va
0800	0900	Sat/Sun	USA, WHRI Cypress Creek SC	5875va
0800	0900		USA, WRMI Miami FL 9955am	
0800	0900		USA, WTJC Newport NC 9370na	
0800	0900		USA, WWCR Nashville TN 3215na 5070na 5890na 5935na	
0800	0900		USA, WWRB Manchester TN 3185va	
0800	0900		USA, WYFR/Family Radio Worldwide 5985na 6915na	
0800	0900		Uzbekistan, CVC International	15515as
0800	0900	vl	Vanuatu, Radio Vanatu 7260do	
0800	0900		Zambia, CVC Intl/Christian Voice 6065af 13590af	
0805	0900	tf	Guam, KTWR/Trans World Radio	15170as
0820	0900	w	Guam, KTWR/Trans World Radio	15170as
0830	0900		Australia, ABC NT Katherine 2485do	
0830	0900		Australia, ABC NT Tennant Creek	2325do
0830	0900	m	Guam, KTWR/Trans World Radio	15170as
0830	0900		Lithuania, Radio Vilnius 9710na	

0900 UTC - 5AM EDT / 4AM CDT / 2AM PDT

0900	0926		Czech Rep, Radio Prague 9880eu 9955am 21745as	
0900	0930		Japan, NHK World/Radio Japan 9625as 9825pa 11815as 15590as	
0900	0957		China, China Radio International	11620as
			15210pa 15270eu 15350as 17490eu	
			17570eu 17690pa 17750as	
0900	1000		Anguilla, Worldwide Univ Network	6090am
0900	1000		Australia, ABC NT Alice Springs	2310do
			4835do	
0900	1000		Australia, ABC NT Katherine 2485do	
0900	1000		Australia, ABC NT Tennant Creek	2325do
0900	1000		Australia, CVC International 15230as	
0900	1000		Australia, Radio Australia 9475va 9580va	
			9590va 9710as 11880as 11945pa	
			12080as 15415as	
0900	1000		Bhutan, Bhutan Broadcasting Svc	6035as
0900	1000		Canada, CFVP Calgary AB 6030na	
0900	1000		Canada, CKZN St John's NF 6160na	
0900	1000		Canada, CKZU Vancouver BC	6160na
0900	1000		Costa Rica, Worldwide Univ Network	5030va
			6150va 7375va 9725va 11870va	
			13750va	
0900	1000		Germany, Deutsche Welle 15340as	17705as
0900	1000		Guyana, Voice of Guyana 3291do	5950do
0900	1000		Malaysia, RTM/Traxx FM 7295as	
0900	1000		New Zealand, Radio NZ International	7145pa
0900	1000	DRM	New Zealand, Radio NZ International	6170pa
0900	1000		Nigeria, Radio Nigeria/Kaduna	4770do
0900	1000		Nigeria, Voice of Nigeria/Lagos	9690af
0900	1000	vl	Papua New Guinea, R East New Britain	3385do
0900	1000	vl	Papua New Guinea, Wantok R. Light	7325va
0900	1000		Saudi Arabia, BSKSA 15250af	
0900	1000	vl	Solomon Islands, SIBC 5020do	
0900	1000		South Africa, Channel Africa 9625af	
0900	1000		UK, BBC World Service 6190af 6195as	
			9740as 9860af 11760me 15310as	
			15400af 15575as 17640af 17760as	
			17790as 17830af 21470af 21660as	
0900	1000		Ukraine, R Ukraine International	11550eu
0900	1000		USA, American Forces Radio 4319usb 5446usb	
			5765usb 6350usb 7811usb 10320usb	
			12133usb 13362usb	
0900	1000		USA, KWHR Naalehu HI 9930as	11565as
0900	1000		USA, WBCQ Monticello ME 5110am	
0900	1000		USA, WBOH Newport NC 5920am	
0900	1000		USA, WEWN Vandiver AL 9355as	
0900	1000		USA, WHRI Cypress Creek SC	5875na
			7385am	
0900	1000		USA, WRMI Miami FL 9955am	
0900	1000		USA, WTJC Newport NC 9370na	
0900	1000		USA, WWCR Nashville TN 5070na 5890na	
			5935na 9985na	
0900	1000		USA, WWRB Manchester TN 3185va	
0900	1000		USA, WYFR/Family Radio Worldwide 5985na	
			6915na 9465as 9755ca	
0900	1000	vl	Vanuatu, Radio Vanatu 7260do	
0900	1000		Zambia, CVC Intl/Christian Voice 6065af	
			13590af	
0905	1000	Sun	Greece, Voice of Greece 9420eu	15605eu
0930	1000	Sun	Italy, IRRS 9510va	
0930	1000	Sun	Slovakia, European Gospel Radio	9510af

1000 UTC - 6AM EDT / 5AM CDT / 3AM PDT

1000	1030		Mongolia, Voice of Mongolia 12085as	
1000	1030		Vietnam, Voice of Vietnam 9840as	12020as
1000	1057		China, China Radio International	6040na
			11610as 11635as 13590as 13620as	
			13720as 15190as 15210pa 15350as	
			15390as 17490eu 17690pa	
1000	1057		Netherlands, R Netherlands Worldwide	5955eu
			11895as 12065as 13820as 15110as	
1000	1058		New Zealand, Radio NZ International	7145pa
1000	1100		Anguilla, Worldwide Univ Network	11775am
1000	1100		Australia, ABC NT Alice Springs	2310do
			4835do	
1000	1100		Australia, ABC NT Katherine 2485do	
1000	1100		Australia, ABC NT Tennant Creek	2325do
1000	1100		Australia, CVC International 15230as	
1000	1100		Australia, Radio Australia 9580as 9590va	
			9710as 11880as 11945pa 12080pa	
			15415as	
1000	1100		Canada, CFVP Calgary AB 6030na	
1000	1100		Canada, CKZN St John's NF 6160na	
1000	1100		Canada, CKZU Vancouver BC	6160na
1000	1100		Costa Rica, Worldwide Univ Network	5030va
			6150va 7375va 9725va 11870va	
			13750va	
1000	1100		Guyana, Voice of Guyana 3291do	5950do
1000	1100		India, All India Radio 7270as	13695pa
			15020as 15260as 15410as 17510pa	
			17800as 17895pa	
1000	1100	Sun	Italy, IRRS 9510va	
1000	1100		Malaysia, RTM/Traxx FM 7295as	
1000	1100	DRM	New Zealand, Radio NZ International	6170pa
1000	1100		Nigeria, Radio Nigeria/Kaduna	4770do
1000	1100		Nigeria, Voice of Nigeria/Lagos	9690af
1000	1100		North Korea, Voice of Korea 11710am	11735as
			13650as 15180am	
1000	1100	vl	Papua New Guinea, R East New Britain	3385do
1000	1100	vl	Papua New Guinea, Wantok R. Light	7325va
1000	1100		Saudi Arabia, BSKSA 15250af	
1000	1100	Sun	Slovakia, European Gospel Radio	9510af
1000	1100	vl	Solomon Islands, SIBC 5020do	
1000	1100		South Africa, Channel Africa 9625af	
1000	1100		UK, BBC World Service 6195as 9740as	
			11760me 15575as 17640af 17760as	
			17790as 21470af 21660as	
1000	1100	Sat/Sun	UK, BBC World Service 15400af 17830af	
1000	1100		USA, American Forces Radio 4319usb 5446usb	
			5765usb 6350usb 7811usb 10320usb	
			12133usb 13362usb	
1000	1100		USA, KNLS Anchor Point AK 6890as	
1000	1100		USA, KWHR Naalehu HI 9930as	11565as
1000	1100		USA, WBOH Newport NC 5920am	
1000	1100		USA, WEWN Vandiver AL 9355as	
1000	1100		USA, WHRI Cypress Creek SC	7385am
			9425am	
1000	1100		USA, WINB Red Lion PA 9265am	
1000	1100		USA, WRMI Miami FL 9955am	
1000	1100		USA, WTJC Newport NC 9370na	
1000	1100		USA, WWCR Nashville TN 5070na 5890na	
			5935na 15825na	
1000	1100		USA, WWRB Manchester TN 3185va	
1000	1100		USA, WYFR/Family Radio Worldwide	5940na
			5985na 6915na 9465as 9755ca	
1000	1100		Zambia, CVC Intl/Christian Voice	6065af
			13590af	
1015	1045	Sun	UK, Bible Voice BC 5985as	
1030	1057		Czech Rep, Radio Prague 9880eu	11665eu
1030	1100		Guam, KSDA/ Adventist World Radio	11780as
1030	1100		Iran, Voice of the Islamic Rep of Iran	15600as
			17600as	
1059	1100		New Zealand, Radio NZ International	9655pa

1100 UTC - 7AM EDT / 6AM CDT / 4AM PDT

1100	1105		Pakistan, Radio Pakistan 15100as	17835as
1100	1127		Iran, Voice of the Islamic Rep of Iran	15600as
			17600as	
1100	1130		UK, BBC World Service 15400af	
1100	1130		Vietnam, Voice of Vietnam 7285as	
1100	1145		USA, WYFR/Family Radio Worldwide	9550sa
			9755ca	
1100	1157		China, China Radio International	5955as
			6040na 11650as 11660as 11750as	
			11795as 13590as 13620eu 13720as	
			13645as 17490eu	
1100	1158	DRM	New Zealand, Radio NZ International	6170pa
1100	1200		Anguilla, Worldwide Univ Network	11775am
1100	1200		Australia, ABC NT Alice Springs	2310do
			4835do	
1100	1200		Australia, ABC NT Katherine 2485do	
1100	1200		Australia, ABC NT Tennant Creek	2325do

1100	1200		Australia, CVC International	15635as		
1100	1200		Australia, Radio Australia	5995va	6020va	
			9475as	9560as	9590va	11880as
			11945pa	12080as		
1100	1200	Sat/Sun	Canada, CBC NQ SW Service	9625na		
1100	1200		Canada, CFVP Calgary AB	6030na		
1100	1200		Canada, CKZN St John's NF	6160na		
1100	1200		Canada, CKZU Vancouver BC		6160na	
1100	1200		Costa Rica, Worldwide Univ Network		5030va	
			6150va	7375va	9725va	11870va
			13750va			
1100	1200	Sun	Italy, IRRS	9510va		
1100	1200		Malaysia, RTM/Traxx FM	7295as		
1100	1200		New Zealand, Radio NZ International		9655pa	
1100	1200		Nigeria, Radio Nigeria/Kaduna		4770do	
1100	1200		Nigeria, Voice of Nigeria/Lagos		9690af	
1100	1200	vl	Papua New Guinea, R East New Britain		3385do	
1100	1200	vl	Papua New Guinea, Wantok R. Light		7325va	
1100	1200		Saudi Arabia, BSKSA	15250af		
1100	1200	Sun	Slovakia, European Gospel Radio		9510af	
1100	1200	vl	Solomon Islands, SIBC	5020do	9545al	
1100	1200		South Africa, Channel Africa	9625af		
1100	1200		Taiwan, R Taiwan International		7445as	
1100	1200		UK, BBC World Service	6190af	6195as	
			9740as	9860af	11760me	15310as
			15340as	15575as	17640af	17760as
			17790as	17830af	21470af	
1100	1200		Ukraine, R Ukraine International		11550eu	
1100	1200		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
1100	1200		USA, KWHR Naalehu HI	9930as		
1100	1200		USA, WBOH Newport NC	5920am		
1100	1200		USA, WEWN Vandiver AL	11560as		
1100	1200		USA, WHRI Cypress Creek SC		7385am	
			9425am			
1100	1200		USA, WINB Red Lion PA	9265am		
1100	1200		USA, WRMI Miami FL	9955am		
1100	1200		USA, WTJC Newport NC	9370na		
1100	1200		USA, WWCR Nashville TN	5935na	7490na	
			9980na	15825na		
1100	1200		USA, WWRB Manchester TN	3185va		
1100	1200		USA, WYFR/Family Radio Worldwide		5950na	
			5985na	7780sa	9625sa	
1100	1200		Zambia, CVC Intl/Christian Voice		6065af	
			13590af			
1115	1130		UK, Bible Voice BC	5950as		
1130	1200		Bulgaria, Radio Bulgaria	11700eu	15700eu	
1130	1200		Guam, KSDA/ Adventist World Radio		15460as	
1130	1200		Vatican City, Vatican Radio	15595eu	17765eu	
1157	1200		Netherlands, R Netherlands Worldwide		5955eu	

1200 UTC - 8AM EDT / 7AM CDT / 5AM PDT

1200	1230		Australia, HCJB Global	15400as		
1200	1230		France, Radio France International		17800af	
1200	1230		Germany, Adventist World Radio Europe		15435as	
1200	1230		Japan, NHK World/Radio Japan		6120na	
			9625as	9695as	17585eu	
1200	1230		Saudi Arabia, BSKSA	15250af		
1200	1245		USA, WYFR/Family Radio Worldwide		5950na	
			5985na			
1200	1256		Romania, R Romania International		15220eu	
1200	1257		China, China Radio International		5955as	
			9460as	9600as	9645as	9730as
			9760pa	11650as	11660as	11760pa
			11980as	13645as	13650eu	13790eu
			17490eu			
1200	1258		New Zealand, Radio NZ International		9655pa	
1200	1259		Netherlands, R Netherlands Worldwide		5955eu	
1200	1259		Poland, Polish Radio	7330eu	9525eu	
1200	1300		Anguilla, Worldwide Univ Network		11775am	
1200	1300		Australia, ABC NT Alice Springs		2310do	
			4835do			
1200	1300		Australia, ABC NT Katherine	2485do		
1200	1300		Australia, ABC NT Tennant Creek		2325do	
1200	1300		Australia, CVC International	13635as		
1200	1300		Australia, Radio Australia	6020va	9475as	
			9560pa	9580va	9590va	11880as
			11945pa			
1200	1300	DRM	Australia, Radio Australia	5995va		
1200	1300	Sat/Sun	Canada, CBC NQ SW Service	9625na		
1200	1300		Canada, CFVP Calgary AB	6030na		
1200	1300		Canada, CKZN St John's NF	6160na		
1200	1300		Canada, CKZU Vancouver BC		6160na	
1200	1300		Costa Rica, Worldwide Univ Network		9725va	
			11870va	13750va		
1200	1300	Sun	Latvia, Radio SWH	9290eu		
1200	1300		Malaysia, RTM/Traxx FM	7295as		
1200	1300		Nigeria, Radio Nigeria/Kaduna		4770do	
1200	1300		Nigeria, Voice of Nigeria/Lagos		9690af	
1200	1300	vl	Papua New Guinea, Wantok R. Light		7325va	
1200	1300	vl	Solomon Islands, SIBC	5020do	9545al	
1200	1300		South Korea, KBS World Radio		9650na	
1200	1300	Fri/ DRM	Taiwan, R Taiwan International		9850eu	
1200	1300		UK, BBC World Service	6190af	6195as	
			9740as	9860af	11750as	11760me
			15310as	15575as	17640af	17790as
			17830af	21470af		
1200	1300		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
1200	1300		USA, KNLS Anchor Point AK	7355as	9780as	
1200	1300		USA, KWHR Naalehu HI	12130as		
1200	1300		USA, Voice of America	6140va	9360va	
			9645va	9760va	12075va	
1200	1300		USA, WBOH Newport NC	5920am		
1200	1300		USA, WEWN Vandiver AL	11560as		
1200	1300	Sat/Sun	USA, WHRA Greenbush ME	15710va		
1200	1300	mtwhf	USA, WHRI Cypress Creek SC		9410na	
1200	1300		USA, WHRI Cypress Creek SC		7385am	
1200	1300		USA, WINB Red Lion PA	13570am		
1200	1300		USA, WRMI Miami FL	9955am		
1200	1300		USA, WTJC Newport NC	9370na		
1200	1300		USA, WWCR Nashville TN	7490na	9980na	
			13845na	15825na		
1200	1300		USA, WWRB Manchester TN	3185va		
1200	1300		USA, WYFR/Family Radio Worldwide		11520as	
			11560as	17555sa	17795ca	
1200	1300		Zambia, CVC Intl/Christian Voice		6065af	
			13590af			
1215	1300		Egypt, Radio Cairo	17835as		
1228	1300	vl	Vatican City, Vatican Radio	11850as		
1230	1300	mtwhfa	Australia, HCJB Global	15540as		
1230	1300		Bangladesh, Bangla Betar	7250as		
1230	1300		Sweden, Radio Sweden	15240na		
1230	1300		Thailand, Radio Thailand	9835va		
1230	1300		Turkey, Voice of Turkey	13685va	15450eu	
1230	1300		Vietnam, Voice of Vietnam	9840as	12020as	
1245	1300	Sat	UK, Bible Voice BC	5950as		

1300 UTC - 9AM EDT / 8AM CDT / 6AM PDT

1300	1325		Turkey, Voice of Turkey	13685pa	15450eu	
1300	1329		Czech Rep, Radio Prague	13580eu	17540as	
1300	1330	mtwhfa	Australia, HCJB Global	15540as		
1300	1330		Egypt, Radio Cairo	17835af		
1300	1330		Serbia, International Radio Serbia		7200eu	
1300	1330	Sun	Slovakia, Universal Life	15750as		
1300	1357		China, China Radio International		5955as	
			9570na	9650na	9730as	9760pa
			9765as	9870as	11660as	11760
			p[a 11980as	13610eu	13755as	13790eu
			15260na	15440as		
1300	1400		Anguilla, Worldwide Univ Network		11775am	
1300	1400		Australia, CVC International	13635as		
1300	1400		Australia, Radio Australia	6020va	9560as	
			9580va	9590va		
1300	1400	DRM	Australia, Radio Australia	5995va		
1300	1400	Sat/Sun	Canada, CBC NQ SW Service	9625na		
1300	1400		Canada, CFVP Calgary AB	6030na		
1300	1400		Canada, CKZN St John's NF	6160na		
1300	1400		Canada, CKZU Vancouver BC		6160na	
1300	1400		Costa Rica, Worldwide Univ Network		9725va	
			11870va	13750va		
1300	1400		Malaysia, RTM/Traxx FM	7295as		
1300	1400		New Zealand, Radio NZ International		6170pa	
1300	1400		Nigeria, Radio Nigeria/Kaduna		4770do	
1300	1400		Nigeria, Voice of Nigeria/Lagos		9690af	
1300	1400		North Korea, Voice of Korea	3560eu	9335am	
			11710na	13760eu	15245eu	
1300	1400	vl	Papua New Guinea, Wantok R. Light		7325va	
1300	1400	vl	Solomon Islands, SIBC	5020do	9545al	
1300	1400		South Korea, KBS World Radio		9570na	
			9770as			
1300	1400		UK, BBC World Service	6190af	6195as	
			9740as	9860af	11750as	11760me
			15310as	15420af	15575as	17640af
			17790as	21470af		
1300	1400		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
1300	1400	mtwhf	USA, KWHR Naalehu HI	9930as		
1300	1400	Sat/Sun	USA, KWHR Naalehu HI	12130as		
1300	1400		USA, Voice of America	9645va	9760va	
1300	1400	Sun	USA, WBCQ Monticello ME	15420am	17495am	
1300	1400		USA, WBOH Newport NC	5920am		
1300	1400		USA, WEWN Vandiver AL	11560as		

1300	1400	Sat/Sun	USA, WHRA Greenbush ME	15710va		
1300	1400		USA, WHRI Cypress Creek SC			9840na
			11785am			
1300	1400		USA, WINB Red Lion PA	13570am		
1300	1400		USA, WRMI Miami FL	9955am		
1300	1400		USA, WTJC Newport NC	9370na		
1300	1400		USA, WWCR Nashville TN	7490na	9980na	
			13845na	15825na		
1300	1400		USA, WWRB Manchester TN	9285va		
1300	1400		USA, WYFR/Family Radio Worldwide			11560as
			11820na	11865na	11910na	17630af
			17715af	17795ca		
1300	1400	vl	Vatican City, Vatican Radio	11850as		
1300	1400		Zambia, CVC Intl/Christian Voice			6065af
			13590af			
1305	1320	m	Austria, Radio Austria International			13730eu
1305	1330	Sat/Sun	Austria, Radio Austria International			13730eu
1310	1340		Japan, NHK World/Radio Japan			11985as
1330	1357	fa/ DRM	Czech Rep, Radio Prague	9850eu		
1330	1400	mthfa	Guam, KSDA/ Adventist World Radio			15275as
1330	1400		India, All India Radio	9690as		11620as
			13710as			
1330	1400		Laos, National Radio	7145as		
1330	1400		Sweden, Radio Sweden	15735va		
1330	1400		USA, Voice of America	9465va		11725va
			15130va	15565va		
1330	1400		Vietnam, Voice of Vietnam	9840as		12020as
1335	1400	Sat/Sun	Austria, Radio Austria International			13730eu
1345	1400	hf	Austria, Radio Austria International			13730eu
1355	1400		Guam, KTWR/Trans World Radio			9975as

1400 UTC - 10AM EDT / 9AM CDT / 7AM PDT

1400	1415	Sat	Germany, Pan American BC	15205me		
1400	1430	Sun	Australia, HCJB Global	15425as		
1400	1430		Australia, HCJB Global	15400as		
1400	1430	sw	Germany, Pan American BC	15205as		
1400	1430	mhf	Guam, KTWR/Trans World Radio			9975as
1400	1430	Sun	Italy, IRRS	15725va		
1400	1430	`	Japan, NHK World/Radio Japan			11705va
			11985as	13630eu	21560eu	
1400	1430		Thailand, Radio Thailand	9805va		
1400	1430	Sun	United Arab Emirates, FEBA	12025as		
1400	1457		China, China Radio International			5995as
			9765as	9870as	11675as	11765as
			13685af	13710eu	13740na	13790eu
			17630af			
1400	1457		Czech Rep, Radio Prague	9955am		
1400	1500		Anguilla, Worldwide Univ Network			11775am
1400	1500		Australia, CVC International	13635as		
1400	1500		Australia, Radio Australia	5995va		6080va
			7240va	9590va		
1400	1500		Bhutan, Bhutan Broadcasting Svc			6035as
1400	1500	Sat/Sun	Canada, CBC NQ SW Service	9625na		
1400	1500		Canada, CFVP Calgary AB	6030na		
1400	1500		Canada, CKZN St John's NF	6160na		
1400	1500		Canada, CKZU Vancouver BC			6160na
1400	1500		Costa Rica, Worldwide Univ Network			9725va
			11870va	13750va		
1400	1500	DRM	Germany, CVC Intl/Voice Africa			7270eu
1400	1500		Germany, The Overcomer Ministries			6110eu
			13810va			
1400	1500	tw	Guam, KTWR/Trans World Radio			9975as
1400	1500		India, All India Radio	9690as		11620as
			13710as			
1400	1500		Jordan, Radio Jordan	11690na		
1400	1500		Libya, Voice of Africa	17725af		21695af
1400	1500		Malaysia, RTM/Traxx FM	7295as		
1400	1500		Netherlands, R Netherlands Worldwide			5830as
			9885as	11835as		
1400	1500		New Zealand, Radio NZ International			6170pa
1400	1500		Nigeria, Radio Nigeria/Kaduna			4770do
1400	1500		Nigeria, Voice of Nigeria/Lagos			9690af
1400	1500		Oman, Radio Oman	15140as		
1400	1500	vl	Papua New Guinea, Wantok R. Light			7325va
1400	1500	DRM	Russia, Voice of Russia	9650eu		
1400	1500		Russia, Voice of Russia	7165as		7255as
			9625as	9660as	9745as	11755as
			15605as	15660as		
1400	1500	vl	Solomon Islands, SIBC	5020do		9545al
1400	1500		UK, BBC World Service	5980as		6190af
			6195as	9740as	11920as	12095as
			15310as	17640af	17830af	21470af
1400	1500	Sat/Sun	UK, Bible Voice BC	15680as		
1400	1500		USA, American Forces Radio	4319usb		5446usb
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
1400	1500		USA, KJES Vado NM	11715na		
1400	1500		USA, KNLS Anchor Point AK	7355as		
1400	1500		USA, KWHR Naalehu HI	9930as		
1400	1500		USA, Voice of America	4930af		6080af
			7430va	9345as	9760va	13750af
			15530va	15580af	17530af	17740va
1400	1500	Sun	USA, WBCQ Monticello ME	15420am		17495am
1400	1500		USA, WBCQ Monticello ME	9930am		
1400	1500		USA, WBOH Newport NC	5920am		
1400	1500		USA, WEWN Vandiver AL	15855as		
1400	1500	Sat/Sun	USA, WHRA Greenbush ME	15195va		
1400	1500		USA, WHRI Cypress Creek SC			9495na
			9840na	11785am		
1400	1500		USA, WINB Red Lion PA	13570am		
1400	1500		USA, WRMI Miami FL	9955na		
1400	1500		USA, WTJC Newport NC	9370na		
1400	1500		USA, WWCR Nashville TN	7490na	9980na	
			13845na	15825na		
1400	1500		USA, WWRB Manchester TN	9385va		
1400	1500		USA, WYFR/Family Radio Worldwide			11560na
			11830na	11910na	13695na	17630af
			17715af	17795ca		
1400	1500	vl	Vatican City, Vatican Radio	11850as		
1400	1500		Zambia, CVC Intl/Christian Voice			6065af
			13590af			
1415	1430	mtwhfa	Germany, Pan American BC	15205as		
1415	1430		Nepal, Radio Nepal	5005as		
1430	1445	Sun	Germany, Pan American BC	15205as		
1430	1459		Vatican City, Vatican Radio	4885eu		7250eu
			9645eu			
1430	1500	mtwhfa	Albania, Radio Tirana	13640na		
1430	1500		Australia, Radio Australia	9475va		11660pa
1430	1500		Ethiopia, Radio Ethiopia	5990af		7110af
			9704af			
1430	1500	f/ DRM	South Korea, KBS World Radio			9460eu
1430	1500		Sweden, Radio Sweden	13820va		13840va
			15240na			

1500 UTC - 11AM EDT / 10AM CDT / 8AM PDT

1500	1510	mtwhfa	Turkmenistan, Turkmen Radio	5015eu		
1500	1528		Vietnam, Voice of Vietnam	7285va		9840va
			12020va			
1500	1530		Guam, KSDA/ Adventist World Radio			11985as
1500	1530		Nigeria, Radio, National Svc/Abuja			7275do
1500	1530		UK, BBC World Service	7380af		11860af
			15420af			
1500	1530	Sat/Sun	UK, Sudan Radio Service	9840af		
1500	1530	vl	Venezuela, R Nacional de Venezuela			11680sa
1500	1545		USA, WYFR/Family Radio Worldwide			15770sa
1500	1550		New Zealand, Radio NZ International			6170pa
1500	1550	vl	Vatican City, Vatican Radio	11850as		
1500	1555		South Africa, Channel Africa	15215af		
1500	1557		Canada, R Canada International			11675as
			17720as			
1500	1557		China, China Radio International			5955as
			6100af	7160as	7325as	9800as
			9870as	11965eu	13640eu	13685af
			13740na	17630af		
1500	1557		Netherlands, R Netherlands Worldwide			5830af
			9885as	11835as		
1500	1600		Anguilla, Worldwide Univ Network			11775am
1500	1600		Australia, CVC International	13635as		
1500	1600		Australia, Radio Australia	5995va		6080va
			7240as	9475va	9590as	11660pa
1500	1600	Sat/Sun	Canada, CBC NQ SW Service	9625na		
1500	1600		Canada, CFVP Calgary AB	6030na		
1500	1600		Canada, CKZN St John's NF	6160na		
1500	1600		Canada, CKZU Vancouver BC			6160na
1500	1600		Costa Rica, Worldwide Univ Network			9725va
			11870va	13750va		
1500	1600		Finland, Overcomer Ministries			9595me
1500	1600	DRM	Germany, CVC Intl/Voice Africa			7270eu
1500	1600		Germany, The Overcomer Ministries			6110eu
			17485af			
1500	1600		Italy, IRRS	9825af		
1500	1600		Jordan, Radio Jordan	11690na		
1500	1600		Libya, Voice of Africa	17725af		21695af
1500	1600		Malaysia, RTM/Traxx FM	7295as		
1500	1600		Myanmar, Myanma Radio	5985as		
1500	1600		Nigeria, Radio Nigeria/Kaduna			4770do
1500	1600		Nigeria, Voice of Nigeria/Lagos			9690af
1500	1600		North Korea, Voice of Korea	3560eu		9335na
			11710eu	13760eu	15245eu	
1500	1600	vl	Papua New Guinea, Wantok R. Light			7325va
1500	1600		Russia, Voice of Russia	4965va		9810eu
1500	1600	vl	Slovakia, Miraya FM Radio	15650af		
1500	1600	vl	Solomon Islands, SIBC	5020do		9545al
1500	1600		Uganda, Dunamis Shortwave	4750af		
1500	1600		UK, BBC World Service	5975as		5980as
			6190af	6195as	9740as	9860af

			11920as	12095va	15310as	15400af	
			17640af	17830af	21470af		
1500	1600	Sat/Sun	UK, BBC World Service		7380af	15420af	
1500	1600		USA, American Forces Radio		4319usb	5446usb	
			5765usb	6350usb	7811usb	10320usb	
			12133usb	13362usb			
1500	1600		USA, KJES Vado NM		11715na		
1500	1600		USA, KWHR Naalehu HI		9930as		
1500	1600		USA, Voice of America		6160va	7125va	
			7430va	9345as	9695va	9695va	
			9760va	12150va	13570af	15310va	
			15530va	15550va	15580af	17895af	
1500	1600	Sun	USA, WBCQ Monticello ME		15420am	17495am	
1500	1600		USA, WBCQ Monticello ME		9330am		
1500	1600		USA, WBOH Newport NC		5920am		
1500	1600		USA, WEWN Vandiver AL		15855as		
1500	1600	Sat/Sun	USA, WHRA Greenbush ME		15195va		
1500	1600		USA, WHRI Cypress Creek SC			9495na	
			9840na	11785am			
1500	1600		USA, WINB Red Lion PA		13570am		
1500	1600		USA, WRMI Miami FL		9955na		
1500	1600		USA, WTJC Newport NC		9370na		
1500	1600		USA, WWCR Nashville TN		7490na	9980na	
			13845na	15825na			
1500	1600		USA, WWRB Manchester TN		9385va		
1500	1600		USA, WYFR/Family Radio Worldwide			6280as	
			11830na	11910na	17795ca		
1500	1600		Zambia, CVC Intl/Christian Voice			6065af	
			13590af				
1505	1520	m	Austria, Radio Austria International			13775na	
1505	1530	Sat/Sun	Austria, Radio Austria International			13775na	
1505	1557		Canada, R Canada International			9515as	
			17720as	11675as			
1515	1530	twhf	Austria, Radio Austria International			13775na	
1515	1545	mtwhf	Swaziland, Trans World Radio			6065af	
1515	1545	smtwhf	Swaziland, Trans World Radio			4760af	
1530	1558		Vatican City, Vatican Radio		13765eu	15235eu	
1530	1600		Germany, Adventist World Radio Europe			15225as	
1530	1600		Iran, Voice of the Islamic Rep of Iran			7375as	
			9600as				
1530	1600		Mongolia, Voice of Mongolia		12085as		
1530	1600		Sweden, Radio Sweden		11590va		
1530	1600	Sun	UK, Bible Voice BC		13590me		
1530	1600	ha	UK, Bible Voice BC		15680as		
1530	1600	mtwhf	UK, Sudan Radio Service		9840af		
1535	1600	Sat/Sun	Austria, Radio Austria International			13775na	
1540	1600	mtwhf	UK, Bible Voice BC		13590me		
1545	1600	mtwhf	Austria, Radio Austria International			13775na	
1545	1600	Sat	UK, Bible Voice BC		13590me		
1551	1600	DRM	New Zealand, Radio NZ International			6170pa	
1551	1600		New Zealand, Radio NZ International			7145pa	

1600 UTC - 12PM EDT / 11AM CDT / 9AM PDT

1600	1615		Pakistan, Radio Pakistan		9385va	11565va	
			15625af				
1600	1615	twha	UK, Bible Voice BC		13590me		
1600	1627		Czech Rep, Radio Prague		5930eu	17485af	
1600	1627		Iran, Voice of the Islamic Rep of Iran			7375as	
			9600as				
1600	1628		Vietnam, Voice of Vietnam		7220va	7280va	
			9550va	9730va			
1600	1630		Guam, KSDA/ Adventist World Radio			11805as	
			11985as				
1600	1630		Myanmar, Myanma Radio		9730do		
1600	1630		Nigeria, Voice of Nigeria/Lagos			9690af	
1600	1630	Sat/Sun	Swaziland, Trans World Radio			6065af	
1600	1630		Yemen, Rep of Yemen Radio		9780me		
1600	1645	Sun	Germany, Pan American BC		13830me		
1600	1645		USA, WYFR/Family Radio Worldwide			11830na	
			11865na				
1600	1657		Canada, R Canada International			9515as	
1600	1657		China, China Radio International			6100af	
			6180me	9570af	9760me	11900af	
			11940eu	11965eu	13760eu		
1600	1658		Germany, Deutsche Welle		6170as	9540as	
			15640as				
1600	1659		Finland, Overcomer Ministries			9595me	
1600	1700		Anguilla, Worldwide Univ Network			11775am	
1600	1700		Australia, CVC International		13635as		
1600	1700		Australia, Radio Australia		5995va	6080va	
			7240as	9475va	9710pa	11660pa	
1600	1700	Sat	Canada, CBC NQ SW Service		9625na		
1600	1700		Canada, CFVP Calgary AB		6030na		
1600	1700		Canada, CKZN St John's NF		6160na		
1600	1700		Canada, CKZU Vancouver BC			6160na	
1600	1700	DRM	Canada, R Canada International			9800na	
1600	1700		Costa Rica, Worldwide Univ Network			11870va	
			13750va				
1600	1700		Egypt, Radio Cairo		12170af		
1600	1700		Ethiopia, Radio Ethiopia		7165af	9560af	
1600	1700		France, Radio France International			15605af	
			17605af				
1600	1700	vl	Guam, KSDA/ Adventist World Radio			11650as	
1600	1700		Italy, IRRS	9825af			
1600	1700		Malaysia, RTM/Traxx FM		7295as		
1600	1700	DRM	New Zealand, Radio NZ International			6170pa	
1600	1700		New Zealand, Radio NZ International			7145pa	
1600	1700		Nigeria, Radio Nigeria/Kaduna			4770do	
1600	1700		North Korea, Voice of Korea		9990va	11545va	
1600	1700	vl	Papua New Guinea, Wantok R. Light			7325va	
1600	1700		Russia, Voice of Russia		4975me	6070as	
			7350as	9405as	9890eu	11985va	
			12055as	13855va			
1600	1700	vl	Rwanda, Radio Rwanda		6055do		
1600	1700	vl	Slovakia, Miraya FM Radio		15650af		
1600	1700	vl	Solomon Islands, SIBC		5020do	9545al	
1600	1700		South Korea, KBS World Radio			9515eu	
1600	1700		Taiwan, R Taiwan International			11550as	
			15515as				
1600	1700		Uganda, Dunamis Shortwave		4750af		
1600	1700		UK, BBC World Service		3255af	5975as	
			6190af	9625as	11920as	12095va	
			15400af	15420af	17640af	17795af	
			17830af	21470af			
1600	1700	Sat/Sun	UK, BBC World Service		7380af		
1600	1700	fs	UK, Bible Voice BC		13590me		
1600	1700		USA, American Forces Radio		4319usb	5446usb	
			5765usb	6350usb	7811usb	10320usb	
			12133usb	13362usb			
1600	1700		USA, KWHR Naalehu HI		9930as		
1600	1700		USA, Voice of America		4930af	6080af	
			12080va	13600va	13615va	15455va	
			15580af	17895va			
1600	1700	Sun	USA, WBCQ Monticello ME		15420am	17495am	
1600	1700		USA, WBCQ Monticello ME		9330am		
1600	1700		USA, WBOH Newport NC		5920am		
1600	1700		USA, WEWN Vandiver AL		15855as		
1600	1700		USA, WHRA Greenbush ME		17520af		
1600	1700		USA, WHRI Cypress Creek SC			9495am	
			9840na	11785am			
1600	1700		USA, WINB Red Lion PA		13570am		
1600	1700		USA, WRMI Miami FL		9955am		
1600	1700		USA, WTJC Newport NC		9370na		
1600	1700		USA, WWCR Nashville TN		9980na	12160na	
			13845na	15825na			
1600	1700		USA, WWRB Manchester TN		9385va	12180va	
1600	1700	Sun	USA, WWRB Manchester TN		11920af		
1600	1700		USA, WYFR/Family Radio Worldwide			6085ca	
			13695na	17795ca	18980va	21525af	
			21455va				
1600	1700		Zambia, CVC Intl/Christian Voice			4965af	
			13590af				
1615	1629		Vatican City, Vatican Radio		5885eu	7250eu	
			9645eu	15595eu			
1615	1630	h	UK, Bible Voice BC		13590me		
1615	1645	mtwhf	Swaziland, Trans World Radio			6130af	
1615	1700	Sun	UK, BBC World Service		11860af		
1615	1700	ta	UK, Bible Voice BC		13590me		
1630	1645	h	UK, Bible Voice BC		13590me		
1630	1657		Slovakia, R Slovakia International			5920eu	
			6055eu				
1630	1700		Nigeria, Voice of Nigeria/Lagos			15120af	
1630	1700	Sat/Sun	Swaziland, Trans World Radio			6130af	
1630	1700	Sat	UK, BBC World Service		11860af		
1640	1650	mtwhfa	Turkmenistan, Turkmen Radio		4930eu		
1645	1700		Tajikistan, Tajik Radio		7245as		

1700 UTC - 1PM EDT / 12PM CDT / 10AM PDT

1700	1705		Canada, R Canada International			9515as	
1700	1705	DRM	Canada, R Canada International			9800na	
1700	1715	t/ vl	UK, Bible Voice BC		13590me		
1700	1720	twhfa	Moldova, Radio PMR/Pridnestrovie			6235eu	
1700	1727		Czech Rep, Radio Prague		5930eu	17485af	
1700	1730		Jordan, Radio Jordan		11690na		
1700	1730	DRM	Romania, R Romania International			7460eu	
1700	1730	Sat	UK, Bible Voice BC		13590me		
1700	1730		USA, Voice of America		6080af	11835af	
			15580af				
1700	1730	Sat	USA, WRMI Miami FL		15650af		
1700	1740	f	Moldova, Radio PMR/Pridnestrovie			6235eu	
1700	1745		UK, BBC World Service		6005af	9410af	
1700	1755		South Africa, Channel Africa		15235af		
1700	1756		Romania, R Romania International			11735eu	
1700	1757		China, China Radio International			6100af	
			6145eu	7130as	7265me	7315me	
			7335eu	9570af	9595eu	11900af	

			11940eu	13760eu		
1700	1757		Netherlands, R Netherlands Worldwide			5955eu
1700	1759		Poland, Polish Radio		7140eu	7265eu
1700	1800		Anguilla, Worldwide Univ Network			11775am
1700	1800		Australia, CVC International		13635as	
1700	1800		Australia, Radio Australia		5995va	6080va
			9475as	9580va	9710as	11880as
1700	1800	Sat	Canada, CBC NQ SW Service		9625na	
1700	1800		Canada, CFVP Calgary AB		6030na	
1700	1800		Canada, CKZN St John's NF		6160na	
1700	1800		Canada, CKZU Vancouver BC			6160na
1700	1800		Costa Rica, Worldwide Univ Network			11870va
			13750va			
1700	1800		Egypt, Radio Cairo		12170af	
1700	1800		Equatorial Guinea, Radio Africa			15190af
1700	1800		Equatorial Guinea, Radio Africa			15190af
1700	1800		Italy, IRRS	9825af		
1700	1800		Malaysia, RTM/Traxx FM		7295as	
1700	1800	DRM	New Zealand, Radio NZ International			6170pa
1700	1800		New Zealand, Radio NZ International			7145pa
1700	1800		Nigeria, Radio Nigeria/Kaduna			4770do
1700	1800		Nigeria, Voice of Nigeria/Lagos			15120af
1700	1800	vl	Papua New Guinea, Wantok R. Light			7325va
1700	1800	Sat	Russia, Voice of Russia		9820eu	9890eu
1700	1800		Russia, Voice of Russia		4975me	7350as
			9405as	11510af	11985af	
1700	1800	Sat/Sun	Russia, Voice of Russia		6000eu	7320eu
			7340eu			
1700	1800	vl	Rwanda, Radio Rwanda		6055do	
1700	1800	vl	Slovakia, Miraya FM Radio		15650af	
1700	1800	vl	Solomon Islands, SIBC		5020eu	9545al
1700	1800		Swaziland, Trans World Radio			3200af
			9500af			
1700	1800		Taiwan, R Taiwan International			11705af
			15690af			
1700	1800		Uganda, Dunamis Shortwave		4750af	
1700	1800		UK, BBC World Service		3255af	5975as
			6190af	6195va	7380af	9625as
			11955as	12095af	13865va	15400af
			17795af	17830af		
1700	1800	fas	UK, Bible Voice BC		9430me	13590me
1700	1800		USA, American Forces Radio		4319usb	5446usb
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
1700	1800		USA, KWHR Naalehu HI		9930as	
1700	1800	Sat/Sun	USA, Voice of America		15675af	
1700	1800		USA, WBCQ Monticello ME		9330am	17495am
1700	1800		USA, WBOH Newport NC		5920am	
1700	1800		USA, WEWN Vandiver AL		15855as	
1700	1800		USA, WHRA Greenbush ME		17520af	
1700	1800		USA, WHRI Cypress Creek SC			9495am
			9840na	11785am		
1700	1800		USA, WINB Red Lion PA		13570am	
1700	1800		USA, WRMI Miami FL		9955am	
1700	1800		USA, WTJC Newport NC		9370na	
1700	1800		USA, WWCR Nashville TN		9980na	12160na
			13845na	15825na		
1700	1800	Sun	USA, WWRB Manchester TN		11920af	
1700	1800		USA, WWRB Manchester TN		9385va	12180va
1700	1800		USA, WYFR/Family Radio Worldwide			13690na
			17795ca	18980ca	21455va	
1700	1800		Zambia, CVC Intl/Christian Voice			4965af
			13590af			
1720	1740	Sat/Sun	USA, Voice of America		4930af	13755af
			15775af			
1730	1757		Vatican City, Vatican Radio		11625af	12765af
			15570af			
1730	1800		Bulgaria, Radio Bulgaria		7200eu	9400eu
1730	1800		Guam, KSDA/ Adventist World Radio			9980as
1730	1800		Swaziland, Trans World Radio			9500af
1730	1800	whf	Sweden, Radio Sweden		6065va	
1730	1800	mtwhf	UK, Sudan Radio Service		9840af	
1730	1800		USA, Voice of America		5980va	5995va
			6080af	9570va	11805va	15410af
			15580af			
1730	1800	mtwhf	USA, Voice of America		4930af	13755af
			15775af			
1745	1800		Bangladesh, Bangla Betar		7250as	
1745	1800		India, All India Radio		7410eu	9445af
			9950eu	11620eu	11935af	13605af
			15075af	15155af	17670af	

1800 UTC - 2PM EDT / 1PM CDT / 11AM PDT

1800	1809		Tanzania, Tanzania Broadcasing Corp			11735af
1800	1815	Sun	UK, Bible Voice BC		13590me	
1800	1815	Sat	UK, Bible Voice BC		11875me	
1800	1828		Vietnam, Voice of Vietnam		9765eu	
1800	1830	w	Austria, Adventist World Radio Europe			15315af
1800	1830		Nigeria, Radio, National Svc/Abuja			7275do
1800	1830		South Africa, AWR Africa		3215af	3345af
			9610af			
1800	1830		UK, BBC World Service		5975as	11955as
1800	1830	Sat	UK, Bible Voice BC		9430me	13590me
1800	1830	Sun	UK, Bible Voice BC		6130eu	
1800	1830		USA, Voice of America		6080af	15410af
			15580af	17865af		
1800	1830	Sat/Sun	USA, Voice of America		4930af	
1800	1845	Sat	UK, Bible Voice BC		6130eu	
1800	1850	DRM	New Zealand, Radio NZ International			6170pa
1800	1850		New Zealand, Radio NZ International			7145pa
1800	1857		China, China Radio International			7120eu
			9600eu	13760eu		
1800	1857		Netherlands, R Netherlands Worldwide			6020af
			11660af	15535af		
1800	1859		Canada, R Canada International			9530af
			11765af	17735af	17810af	
1800	1900		Anguilla, Worldwide Univ Network			11775am
1800	1900	mtwhf	Argentina, RAE	9690am	15345am	
1800	1900		Australia, Radio Australia		6080va	7240as
			9475va	9580as	9710as	11880as
1800	1900		Bangladesh, Bangla Betar		7250eu	
1800	1900		Canada, CFVP Calgary AB		6030na	
1800	1900		Canada, CKZN St John's NF		6160na	
1800	1900		Canada, CKZU Vancouver BC			6160na
1800	1900		Costa Rica, Worldwide Univ Network			11870va
			13750va			
1800	1900		Equatorial Guinea, Radio Africa			15190af
1800	1900		Equatorial Guinea, Radio Africa			15190af
1800	1900		India, All India Radio		7410eu	9445af
			9950eu	11620eu	11935af	13605af
			15075af	15155af	17670af	
1800	1900	fas	Italy, IRRS		7290va	
1800	1900		Kuwait, Radio Kuwait		11990va	
1800	1900		Malaysia, RTM/Traxx FM		7295as	
1800	1900		Netherlands, R Netherlands Worldwide			7395af
1800	1900		Nigeria, Radio Nigeria/Kaduna			4770do
1800	1900		Nigeria, Voice of Nigeria/Lagos			15120af
1800	1900		North Korea, Voice of Korea			3560eu
1800	1900	vl	Papua New Guinea, Wantok R. Light			13760eu
1800	1900		Russia, Voice of Russia		7325va	
			9850af	9890eu	9480eu	9745af
1800	1900	vl	Rwanda, Radio Rwanda		6055do	
1800	1900	fas	Slovakia, European Gospel Radio			7290af
1800	1900	vl	Solomon Islands, SIBC		5020do	9545al
1800	1900		South Korea, KBS World Radio			7275eu
1800	1900		Swaziland, Trans World Radio			3200af
			9500af			
1800	1900		Taiwan, R Taiwan International			3965eu
1800	1900		Uganda, Dunamis Shortwave		4750af	
1800	1900		UK, BBC World Service		3255af	5895va
			5995as	6190af	6195va	7380af
			9485as	12095af	13865va	15400af
			17795af	17830af		
1800	1900	Sun	UK, Bible Voice BC		9430me	
1800	1900		USA, American Forces Radio		4319usb	5446usb
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
1800	1900		USA, WBCQ Monticello ME		7415am	9330am
			17495am			
1800	1900		USA, WBOH Newport NC		5920am	
1800	1900		USA, WEWN Vandiver AL		15855as	
1800	1900		USA, WHRA Greenbush ME		17690af	
1800	1900	mtwhf	USA, WHRI Cypress Creek SC			17520af
1800	1900	Sat/Sun	USA, WHRI Cypress Creek SC			9495am
1800	1900		USA, WHRI Cypress Creek SC			9840na
			11785am			
1800	1900		USA, WINB Red Lion PA		13570am	
1800	1900		USA, WRMI Miami FL		9955am	
1800	1900		USA, WTJC Newport NC		9370na	
1800	1900		USA, WWCR Nashville TN		9980na	12160na
			13845na	15825na		
1800	1900	Sun	USA, WWRB Manchester TN		11920af	
1800	1900		USA, WWRB Manchester TN		9385va	12180va
1800	1900		USA, WYFR/Family Radio Worldwide			11775eu
			13615na	13690na	13790af	17795ca
			17845af	18980va		
1800	1900		Yemen, Rep of Yemen Radio		9780me	
1800	1900		Zambia, CVC Intl/Christian Voice			4965af
			13590af			
1830	1857		Slovakia, R Slovakia International			5920eu
			6055eu			
1830	1900		Serbia, International Radio Serbia			6100eu
			7200eu			
1830	1900		Turkey, Voice of Turkey		9785eu	
1830	1900		UK, BBC World Service		6005af	9410af
1830	1900	f	UK, Bible Voice BC		9430me	
1830	1900	Sun	UK, Bible Voice BC		6130eu	

1830	1900		USA, Voice of America	4930af	6080af	
			9820va	9520va	9885af	11755va
			11805va	15410af	15580af	17895af
1845	1900	mtwhfa	Albania, Radio Tirana	7430eu	13640eu	
1845	1900	Sun	UK, Bible Voice BC	11830af		
1851	1900	DRM	New Zealand, Radio NZ International	9890pa		
1851	1900		New Zealand, Radio NZ International	9615pa		

1900 UTC - 3PM EDT / 2PM CDT / 12PM PDT

1900	1925		Turkey, Voice of Turkey	9785eu		
1900	1928		Vietnam, Voice of Vietnam	7280va	9730va	
1900	1930		Germany, Deutsche Welle	9565af	11795af	
			17860af			
1900	1930	Sun	UK, Bible Voice BC	6130eu	13710af	
1900	1935	DRM	New Zealand, Radio NZ International	9890pa		
1900	1945		India, All India Radio	7410eu	9445af	
			9950eu	11620eu	11935af	13605af
			15075af	15155af	17670af	
1900	1945		USA, WYFR/Family Radio Worldwide	6085ca		
1900	1950		New Zealand, Radio NZ International	9615pa		
1900	1957		China, China Radio International	7295va		
			9435va			
1900	1957		Netherlands, R Netherlands Worldwide	5905af		
			7425af	11660af	15335af	15535af
1900	2000		Anguilla, Worldwide Univ Network	11775am		
1900	2000		Australia, Radio Australia	6080va	7240as	
			9500va	9580va	9710as	11880as
1900	2000		Canada, CFVP Calgary AB	6030na		
1900	2000		Canada, CKZN St John's NF	6160na		
1900	2000		Canada, CKZU Vancouver BC	6160na		
1900	2000		Costa Rica, Worldwide Univ Network	11870va		
			13750va			
1900	2000		Egypt, Radio Cairo	9300af		
1900	2000		Equatorial Guinea, Radio Africa	15190af		
1900	2000		Finland, Overcomer Ministries	6060eu		
1900	2000		Germany, The Overcomer Ministries	6175eu		
1900	2000	fas	Italy, IRRS	7290va		
1900	2000		Kuwait, Radio Kuwait	11990va		
1900	2000		Malaysia, RTM/Traxx FM	7295as		
1900	2000		Netherlands, R Netherlands Worldwide	7395af		
1900	2000		Nigeria, Radio Nigeria/Kaduna	4770do		
1900	2000		Nigeria, Voice of Nigeria/Lagos	15120af		
1900	2000		North Korea, Voice of Korea	7100af	9975va	
			11535va	11910af		
1900	2000	vl	Papua New Guinea, Wantok R. Light	7325va		
1900	2000		Russia, Voice of Russia	7310eu	7195eu	
			7310eu			
1900	2000	vl	Rwanda, Radio Rwanda	6055do		
1900	2000	fas	Slovakia, European Gospel Radio	7290af		
1900	2000	vl	Solomon Islands, SIBC	5020do		
1900	2000		South Africa, SA Radio League	3215af		
1900	2000	mtwhf	Spain, Radio Exterior Espana	9665eu	11620af	
1900	2000		Swaziland, Trans World Radio	3200af		
			9500af			
1900	2000		Thailand, Radio Thailand	7155eu		
1900	2000	vl	Uganda, UBC Radio	4976do	5026do	
1900	2000		UK, BBC World Service	3255af	5875va	
			5995as	6005af	6190af	9410af
			9485as	12095af	15400af	17795af
			17830af			
1900	2000		Ukraine, R Ukraine International	7490eu		
1900	2000		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
1900	2000		USA, KJES Vado NM	15385na		
1900	2000		USA, Voice of America	4930af	6080af	
			7480va	9670va	9885af	15410af
			15580af	17895af		
1900	2000		USA, WBCQ Monticello ME	7415am	9330am	
			17495am			
1900	2000		USA, WBOH Newport NC	5920am		
1900	2000		USA, WEWN Vandiver AL	17595af		
1900	2000		USA, WHRA Greenbush ME	17690af		
1900	2000	Sat	USA, WHRI Cypress Creek SC	9495am		
1900	2000		USA, WHRI Cypress Creek SC	11785am		
1900	2000		USA, WINB Red Lion PA	13570am		
1900	2000		USA, WRMI Miami FL	9955am		
1900	2000		USA, WTJC Newport NC	9370na		
1900	2000		USA, WWCR Nashville TN	9980na	12160na	
			13845na	15825na		
1900	2000		USA, WWRB Manchester TN	9385va	12180va	
1900	2000		USA, WYFR/Family Radio Worldwide	3230af		
			9685af	11775eu	11865af	13615na
			13690ca	17795af	17845eu	18930va
			18980va			
1900	2000		Zambia, CVC Intl/Christian Voice	4965af		
			13590af			
1930	2000	fas	Germany, Pan American BC	9515va		
1930	2000		Iran, Voice of the Islamic Rep of Iran	6205eu		
			7205eu	7260af	9800af	9925af
1936	2000	DRM	New Zealand, Radio NZ International	11675pa		
1945	2000	DRM	Vatican City, Vatican Radio	9800na		
1950	2000		Vatican City, Vatican Radio	5885eu	7250eu	
			9645eu			
1951	2000		New Zealand, Radio NZ International	11725pa		

2000 UTC - 4PM EDT / 3PM CDT / 1PM PDT

2000	2015	Sun	Germany, Pan American BC	9515va		
2000	2019		Vatican City, Vatican Radio	5885eu	7250eu	
			9645eu			
2000	2019	DRM	Vatican City, Vatican Radio	9800na		
2000	2027		Czech Rep, Radio Prague	5930eu	11600pa	
2000	2027		Iran, Voice of the Islamic Rep of Iran	6205eu		
			7205eu	7260af	9800af	9925af
2000	2027		Vatican City, Vatican Radio	7365af	9755af	
			11625af			
2000	2030	mtwhfa	Albania, Radio Tirana	7465eu	13600na	
2000	2030		China, China Radio International	7160eu		
2000	2030		Egypt, Radio Cairo	9300af		
2000	2030	fa	Germany, Pan American BC	9515va		
2000	2030		South Africa, AWR Africa	9655af		
2000	2030		USA, Voice of America	4930af	4940af	
			6080af	15580af	17895af	
2000	2045		Swaziland, Trans World Radio	3200af		
2000	2045		USA, WYFR/Family Radio Worldwide	17750eu		
2000	2050		New Zealand, Radio NZ International	11725pa		
2000	2050	DRM	New Zealand, Radio NZ International	11675pa		
2000	2057		China, China Radio International	5960eu		
			5985af	7190eu	7285eu	7295va
			9440va	9660eu		
2000	2057		Germany, Deutsche Welle	6150af	11795af	
			11865af	15205af		
2000	2057		Netherlands, R Netherlands Worldwide	5905af		
			7425af	17810af		
2000	2059		Canada, R Canada International	11765af		
			13650af	15235af	17735af	
2000	2059		Finland, Overcomer Ministries	6060eu		
2000	2100		Anguilla, Worldwide Univ Network	11775am		
2000	2100		Australia, ABC NT Alice Springs	2310do		
			4835do			
2000	2100		Australia, ABC NT Katherine	2485do		
2000	2100		Australia, ABC NT Tennant Creek	2325do		
2000	2100	Sat/Sun	Australia, Radio Australia	6080va	7240as	
			12080as			
2000	2100		Australia, Radio Australia	9500va	11650as	
			11660pa	11880as		
2000	2100		Belarus, Radio Minsk	7105eu	7360eu	
			7390eu			
2000	2100		Canada, CFVP Calgary AB	6030na		
2000	2100		Canada, CKZN St John's NF	6160na		
2000	2100		Canada, CKZU Vancouver BC	6160na		
2000	2100		Costa Rica, Worldwide Univ Network	13750va		
2000	2100		Equatorial Guinea, Radio Africa	15190af		
2000	2100		Germany, The Overcomer Ministries	5995eu		
			6175eu			
2000	2100		Indonesia, Voice of Indonesia	9525al	11785pa	
			15150as			
2000	2100		Kuwait, Radio Kuwait	11990va		
2000	2100	vl	Liberia, ELWA	4760do		
2000	2100		Malaysia, RTM/Traxx FM	7295as		
2000	2100		Netherlands, R Netherlands Worldwide	6020af		
2000	2100		Nigeria, Radio Nigeria/Kaduna	4770do		
2000	2100		Nigeria, Voice of Nigeria/Lagos	15120af		
2000	2100	vl	Papua New Guinea, R East New Britain	3385do		
2000	2100	vl	Papua New Guinea, Wantok R. Light	7325va		
2000	2100		Russia, Voice of Russia	7195eu	9890eu	
2000	2100	vl	Rwanda, Radio Rwanda	6055do		
2000	2100		South Africa, Channel Africa	3345af		
2000	2100	mtwhf	Spain, Radio Exterior Espana	9665eu	11620af	
2000	2100	vl	Uganda, UBC Radio	4976do	5026do	
2000	2100		UK, BBC World Service	3255af	5875va	
			6005af	6190af	9410af	12095af
			13820af	15400af	17830af	
2000	2100		USA, American Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
2000	2100		USA, WBCQ Monticello ME	7415am	9330am	
			17495am			
2000	2100		USA, WBOH Newport NC	5920am		
2000	2100		USA, WEWN Vandiver AL	17595af		
2000	2100	mtwhf	USA, WHRA Greenbush ME	7520va		
2000	2100	Sat/Sun	USA, WHRA Greenbush ME	11885va		
2000	2100	f	USA, WHRI Cypress Creek SC	17650am		
2000	2100	asmtwh	USA, WHRI Cypress Creek SC	9495am		
2000	2100		USA, WINB Red Lion PA	13570am		
2000	2100		USA, WRMI Miami FL	9955am		

2000	2100		USA, WTJC Newport NC	9370na		
2000	2100		USA, WWCR Nashville TN	9980na	12160na	13845na 15825na
2000	2100	Sun	USA, WWRB Manchester TN	11920af		
2000	2100		USA, WWRB Manchester TN	9385va	12180va	
2000	2100		USA, WYFR/Family Radio Worldwide	7430eu		13615na 17725sa 17795ca 17845af 18980va
2000	2100		Zambia, CVC Intl/Christian Voice	4965af		13590af
2005	2100		Syria, Radio Damascus	9330eu	12085eu	
2030	2045		Thailand, Radio Thailand	9680eu		
2030	2056		Romania, R Romania International	9515eu		11940na 15465na
2030	2058		Vietnam, Voice of Vietnam	7220va	7280va	9550va 9730va
2030	2100		Cuba, Radio Havana Cuba	9505va	11760va	
2030	2100		Netherlands, R Netherlands Worldwide	7395af		
2030	2100		Sweden, Radio Sweden	7395va		
2030	2100		Turkey, Voice of Turkey	7170va		
2030	2100		USA, Voice of America	4930af	6080af	7555as 15580af 17895af
2030	2100	Sat/Sun	USA, Voice of America	11720af		
2045	2100		India, All India Radio	7410eu	9445eu	9910pa 9950eu 11620va 11715pa
2051	2100		New Zealand, Radio NZ International	15720pa		
2051	2100	DRM	New Zealand, Radio NZ International	13730pa		

2100 UTC - 5PM EDT / 4PM CDT / 2PM PDT

2100	2125		Turkey, Voice of Turkey	7170pa		
2100	2127		China, China Radio International	11640af		13630af
2100	2130		Australia, ABC NT Katherine	2485do		
2100	2130		Australia, ABC NT Tennant Creek	2325do		
2100	2130		Austria, Adventist World Radio Europe	11955af		
2100	2130	Sat	Canada, CBC NQ SW Service	9625na		
2100	2130		Cuba, Radio Havana Cuba	9505va	11760va	
2100	2130		Nigeria, Radio, National Svc/Abuja	7275do		
2100	2130		Serbia, International Radio Serbia	6100eu		7200eu
2100	2130		South Africa, AWR Africa	11955af		
2100	2130		South Korea, KBS World Radio	3955eu		
2100	2145		USA, WYFR/Family Radio Worldwide	13615na		17795ca 18980va
2100	2157		China, China Radio International	5960eu		6135eu 7190eu 7285eu 7325af 9600eu
2100	2200		Angola, Radio Nacional de Angola	7217do		
2100	2200		Anguilla, Worldwide Univ Network	11775am		
2100	2200		Australia, ABC NT Alice Springs	2310do		4835do
2100	2200		Australia, Radio Australia	9500as	9660as	11650pa 11660pa 11695as 12080as 13630as 15515as
2100	2200		Belarus, Radio Minsk	7105eu	7390eu	
2100	2200		Bulgaria, Radio Bulgaria	5900eu	9700eu	
2100	2200		Canada, CFVP Calgary AB	6030na		
2100	2200		Canada, CKZN St John's NF	6160na		
2100	2200		Canada, CKZU Vancouver BC	6160na		
2100	2200		Costa Rica, Worldwide Univ Network	13750va		
2100	2200		Equatorial Guinea, Radio Africa	15190af		
2100	2200		Germany, Deutsche Welle	9735af	11865af	15205af
2100	2200		Germany, The Overcomer Ministries	5995eu		
2100	2200		Guyana, Voice of Guyana	3291do	5950do	
2100	2200		India, All India Radio	7410eu	9445eu	9950pa 11620eu
2100	2200	vl	Liberia, ELWA	4760do		
2100	2200		Malaysia, RTM/Traxx FM	7295as		
2100	2200		New Zealand, Radio NZ International	15720pa		
2100	2200	DRM	New Zealand, Radio NZ International	13730pa		
2100	2200		Nigeria, Radio Nigeria/Kaduna	4770do		
2100	2200		Nigeria, Voice of Nigeria/Lagos	7255af		
2100	2200		North Korea, Voice of Korea	7560eu	13760eu	15245eu
2100	2200	vl	Papua New Guinea, Wantok R. Light	7325va		
2100	2200		South Africa, Channel Africa	3345af		
2100	2200	Sat/Sun	Spain, Radio Exterior Espana	9840eu		
2100	2200		Syria, Radio Damascus	9330eu	12085eu	
2100	2200		UK, BBC World Service	3255af	3915as	5875va 5905as 6005af 6190af 6195as 7120af 12095af 15400af
2100	2200		Ukraine, R Ukraine International	7510eu		
2100	2200		USA, American Forces Radio	4319usb	5446usb	5765usb 6350usb 7811usb 10320usb 12133usb 13362usb
2100	2200		USA, Voice of America	6080af	7555as	15580af
2100	2200		USA, WBCQ Monticello ME	5110am	7415am	17495am
2100	2200		USA, WBOH Newport NC	5920am		
2100	2200		USA, WEWN Vandiver AL	17595af		
2100	2200		USA, WHRA Greenbush ME	11885va		
2100	2200		USA, WHRI Cypress Creek SC	11785am		15665na
2100	2200		USA, WINB Red Lion PA	13570am		
2100	2200		USA, WRMI Miami FL	9955am		
2100	2200		USA, WTJC Newport NC	9370na		
2100	2200		USA, WWCR Nashville TN	7465na	9980na	12160na 13845na
2100	2200	Sun	USA, WWRB Manchester TN	11920af		
2100	2200		USA, WWRB Manchester TN	9385va	12180va	
2100	2200		USA, WYFR/Family Radio Worldwide	3230af		740eu 11565eu 17845 sf
2100	2200		Zambia, CVC Intl/Christian Voice	4965af		
2115	2200		Egypt, Radio Cairo	11550eu		
2130	2157		Czech Rep, Radio Prague	9410af	11600na	
2130	2200		Australia, ABC NT Katherine	5025do		
2130	2200		Australia, ABC NT Tennant Creek	4910do		
2130	2200	mtwhfa	Canada, CBC NQ SW Service	9625na		
2130	2200		Guam, KSDA/ Adventist World Radio	11850as		
2130	2200		Lithuania, Mighty KBC Radio	6055eu		
2130	2200		Netherlands, R Netherlands Worldwide	7420pa		
2130	2200		Sweden, Radio Sweden	6065va	7420pa	

2200 UTC - 6PM EDT / 5PM CDT / 3PM PDT

2200	2210		Syria, Radio Damascus	9330eu	12085eu	
2200	2220		Japan, NHK World/Radio Japan	13640as		
2200	2229		Lithuania, Mighty KBC Radio	6055eu		
2200	2230		India, All India Radio	9910pa	11620pa	11715pa
2200	2235		New Zealand, Radio NZ International	15720pa		
2200	2245		Egypt, Radio Cairo	11550eu		
2200	2245		USA, WYFR/Family Radio Worldwide	15770af		
2200	2255		Turkey, Voice of Turkey	6195va		
2200	2256		Romania, R Romania International	7185eu		9675eu 9790na
2200	2257		China, China Radio International	7175eu		
2200	2300		Anguilla, Worldwide Univ Network	6090am		
2200	2300		Australia, ABC NT Alice Springs	2310do		4835do
2200	2300		Australia, ABC NT Katherine	5025do		
2200	2300		Australia, ABC NT Tennant Creek	4910do		
2200	2300		Australia, Radio Australia	11840va	12010va	13630pa 15230va 15240pa 15515as 17785pa
2200	2300	smtwhf	Canada, CBC NQ SW Service	9625na		
2200	2300		Canada, CFVP Calgary AB	6030na		
2200	2300		Canada, CKZN St John's NF	6160na		
2200	2300		Canada, CKZU Vancouver BC	6160na		
2200	2300		China, China Radio International	9590as		
2200	2300		Costa Rica, Worldwide Univ Network	13750va		
2200	2300		Equatorial Guinea, Radio Africa	15190af		
2200	2300		Guyana, Voice of Guyana	3291do		
2200	2300	vl	Liberia, ELWA	4760do		
2200	2300		Malaysia, RTM/Traxx FM	7295as		
2200	2300	DRM	New Zealand, Radio NZ International	13730pa		
2200	2300		Nigeria, Radio Nigeria/Kaduna	4770do		
2200	2300		Nigeria, Voice of Nigeria/Lagos	7255af		
2200	2300	vl	Papua New Guinea, Wantok R. Light	7325va		
2200	2300		Taiwan, R Taiwan International	9355eu		
2200	2300		UK, BBC World Service	5905as	5975as	6005af 6195as 9740as 12095af 15400af
2200	2300		USA, American Forces Radio	4319usb	5446usb	5765usb 6350usb 7811usb 10320usb 12133usb 13362usb
2200	2300		USA, Voice of America	5895va	7120va	7460va 7555as 9415va 11725va 15185va
2200	2300	mtw	USA, WBCQ Monticello ME	17495am		
2200	2300		USA, WBCQ Monticello ME	5110am	7415am	9330am
2200	2300		USA, WBOH Newport NC	5920am		
2200	2300		USA, WEWN Vandiver AL	15665af		
2200	2300		USA, WHRA Greenbush ME	11855va		
2200	2300		USA, WHRI Cypress Creek SC	7385na		9615na 11785am
2200	2300		USA, WINB Red Lion PA	9265am		
2200	2300		USA, WRMI Miami FL	9955am		
2200	2300		USA, WTJC Newport NC	9370na		
2200	2300		USA, WWCR Nashville TN	5070na	7465na	9980na 13845na
2200	2300		USA, WWRB Manchester TN	6890va	9385va	

			12180va			
2200	2300		USA, WYFR/Family Radio Worldwide			11740na
2200	2300		Zambia, CVC Intl/Christian Voice			4965af
2230	2257		Czech Rep, Radio Prague		7345na	9415na
2230	2300		Guam, KSDA/ Adventist World Radio			15320as
2230	2300	DRM	Sweden, Radio Sweden		9800na	
2230	2300		USA, Voice of America		9570va	11705va
			15145va			
2236	2300		New Zealand, Radio NZ International			15720pa
2245	2300		India, All India Radio		9705eu	9950as
			11620as	11645as	13605as	

2300 UTC - 7PM EDT / 6PM CDT / 4PM PDT

2300	0000		Anguilla, Worldwide Univ Network			6090am
2300	0000		Australia, ABC NT Alice Springs			2310do
			4835do			
2300	0000		Australia, ABC NT Katherine		5025do	
2300	0000		Australia, ABC NT Tennant Creek			4910do
2300	0000		Australia, Radio Australia		9660as	11840va
			12010pa	12080pa	13690pa	15230va
			15240pa	15560va	17795va	
2300	0000		Australia, Radio Australia		9660as	11840as
			12010va	12080pa	13690pa	15230va
			17785pa	17795va		
2300	0000		Bulgaria, Radio Bulgaria		9700na	11700na
2300	0000	smtwhf	Canada, CBC NQ SW Service		9625na	
2300	0000		Canada, CFVP Calgary AB		6030na	
2300	0000		Canada, CKZN St John's NF		6160na	
2300	0000		Canada, CKZU Vancouver BC			6160na
2300	0000		China, China Radio International			5915as
			5990am	6145na	7180as	9460as
			11690as	11970ca		
2300	0000	DRM	China, China Radio International			9800ca
2300	0000		Costa Rica, Worldwide Univ Network			13750va
2300	0000		Cuba, Radio Havana Cuba		9505am	9550am
2300	0000		Egypt, Radio Cairo		9280na	
2300	0000		Guyana, Voice of Guyana		3291do	
2300	0000		India, All India Radio		9950as	11645as
			13605as			
2300	0000		Malaysia, RTM/Traxx FM		7295as	
2300	0000	DRM	New Zealand, Radio NZ International			13730pa
2300	0000		New Zealand, Radio NZ International			15720pa
2300	0000	vl	Papua New Guinea, Wantok R. Light			7325va
2300	0000		UK, BBC World Service		3915as	5965as
			6195as	9740as	9885as	11955as
			12010as			
2300	0000		USA, American Forces Radio		4319usb	5446usb
			5765usb	6350usb	7811usb	10320usb
			12133usb	13362usb		
2300	0000		USA, Voice of America		5895va	7120va
			7555as	9415va	9570va	11725va
			13755va	15145va	15185va	
2300	0000		USA, WBCQ Monticello ME		5110am	7415am
			9330am			
2300	0000		USA, WBOH Newport NC		5920am	
2300	0000		USA, WEWN Vandiver AL		15665af	
2300	0000		USA, WHRA Greenbush ME		5850eu	
2300	0000		USA, WHRI Cypress Creek SC			7315na
			9615na	11785am		
2300	0000	mtwhfa	USA, WHRI Cypress Creek SC			11785na
2300	0000		USA, WHRI Cypress Creek SC			7315am
2300	0000		USA, WRMI Miami FL		9955am	
2300	0000		USA, WTJC Newport NC		9370na	
2300	0000		USA, WWCR Nashville TN		5070na	7465na
			9980na	13845na		
2300	0000		USA, WWRB Manchester TN		6890va	9385va
			12180va			
2300	0000		USA, WYFR/Family Radio Worldwide			15255sa
			17750sa			
2300	0000		Zambia, CVC Intl/Christian Voice			4965af
2300	2305	vl	Liberia, ELWA	4760do		
2300	2315		Nigeria, Radio Nigeria/Kaduna			4770do
2300	2327		Vatican City, Vatican Radio		9600va	12035va
2300	2330		Australia, Radio Australia		15240pa	
2300	2330	w	USA, WBCQ Monticello ME		17495am	
2300	2345		USA, WYFR/Family Radio Worldwide			11740na
2305	0000	twhfa	Canada, R Canada International			6100na
2305	0000	Sun	Greece, Voice of Greece		7475eu	9420eu
2315	2330	vl	Croatia, Croatian Radio		9925na	
2330	0000		Australia, Radio Australia		15415as	17750va
2330	0000		Lithuania, Radio Vilnius		9875na	
2330	0000		UK, BBC World Service		9580as	
2330	0000		USA, Voice of America		7350va	9570va
			13755va	15145va	15340va	
2330	2358		Vietnam, Voice of Vietnam		9840as	12020as

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Albania, Radio Tirana	http://rtsh.sil.at/
Angola, Radio Nacional de Angola	www.rna.ao/
Anguilla, Worldwide Univ Network	www.worldwideuniversitynetwork.com/
Argentina, RAE	www.radionacional.gov.ar/rae/rae.asp
Australia, ABC NT Alice Springs	www.abc.net.au/radio/
Australia, ABC NT Katherine	www.abc.net.au/radio/
Australia, ABC NT Tennant Creek	www.abc.net.au/radio/
Australia, CVC International	www.christianvision.com/
Australia, HCJB Global	www.hcjb.org/
Australia, Radio Australia	www.abc.net.au/ra/
Austria, AWR Europe	www.awr2.org/
Austria, Radio Austria Intl	http://oe1.orf.at/service/international
Bahrain, Radio Bahrain	www.radiobahrain.net/
Bangladesh, Bangla Betar	www.betar.org.bd/
Belarus, Radio	www.radiobelarus.tvr.by/eng/
Bhutan, BBS	www.bbs.com.bt/
Bulgaria, Radio	www.bnr.bg/
Canada, CBC NQ SW Service	www.cbc.ca/north/
Canada, Radio Canada Intl	www.rcinet.ca/
China, China Radio Intl	www.cri.cn/
Costa Rica, Worldwide Univ Network	www.worldwideuniversitynetwork.com/
Croatia, Croatian Radio	www.hrt.hr/
Cuba, Radio Havana	www.radiohc.cu/
Czech Rep, Radio Prague	www.radio.cz/en/
Finland, Overcomer Ministries	www.overcomerministries.org
France, Radio France Intl	http://rfienglish.com
Germany, AWR Europe	www.awr2.org/
Germany, CVC Intl/Voice Africa	www.christianvision.com/
Germany, Deutsche Welle	www.dw-world.de/
Germany, Overcomer Ministries	www.overcomerministry.org/
Germany, Pan American BC	www.radiopanam.com/
Germany, The Overcomer Ministries	www.overcomerministry.org/
Germany, TWR Europe	www.twr.org/
Greece, Voice of Greece	www.voiceofgreece.gr/
Guam, AWR/KSDA	www.awr2.org/
Guam, TWR/KTWR	www.twr.org/
Guyana, Voice of	http://voiceofguyana.com/
India, All India Radio	www.allindiaradio.org/
Indonesia, Voice of Indonesia	www.rri-online.com/
Iran, Voice of the Islamic Rep of Iran	www2.irib.ir/worldservice/
Japan, NHK World/Radio Japan	www.nhk.or.jp/english/
Jordan, Radio	www.jrtv.jo/rj/index.php
Latvia, Radio SWH	www.radioswh.lv/index.php
Liberia, ELWA	www.elwaministries.org/
Liberia, Star Radio	www.radioswh.lv/index.php
Libya, Voice of Africa	www.ljbc.net/home.php
Lithuania, Radio Vilnius	www.lrt.lt/
Malaysia, RTM/Traxx FM	www.traxxfm.net/index.htm
Malaysia, RTM/Voice of Malaysia	http://202.190.233.9/vom/utama.htm
Monaco, TWR Europe	www.twr.org/
Nepal, Radio	www.radionepal.org/
Nepal, Radio	www.radionepal.org/
Netherlands, Radio Netherlands	www.radionetherlands.nl/
New Zealand, Radio NZ Intl	www.rnzi.com
Nigeria, Radio, Natl Svc/Abuja	http://radionigeriaonline.com
Nigeria, Radio/Kaduna	http://radionigeriaonline.com
Nigeria, Voice of/ Ext. Svc Lagos	www.voiceofnigeria.org
Oman, Radio Oman	www.oman-tv.gov.om
Pakistan, Radio	www.radio.gov.pk
Papua New Guinea, NBC	www.nbc.com.pg/
Papua New Guinea, Wantok R. Light	http://wantokradio.net/
Philippines, Radio Pilipinas	www.radiopilipinas.com/
Poland, Polish Radio	www.polskieradio.pl/zagranica/gb/
Romania, Radio Romania Intl	www.rri.ro/
Russia, Voice of Russia	www.vor.ru/world.html
Saudi Arabia, BSKSA	www.saudiradio.net/
Singapore, MediaCorp Radio	www.mediacorpradio.sg
Singapore, Radio Singapore Intl	www.rsi.sg
Slovakia, Radio Slovakia Int	www.rsi.sk
Solomon Islands, SIBC	www.sibconline.com.sb/
South Africa, AWR Africa	www.awr2.org/
South Africa, Channel Africa	www.channelafrica.org
South Africa, Trans World Radio	www.twr.org/
South Korea, KBS World Radio	http://rki.kbs.co.kr/english/
Spain, Radio Exterior Espana	www.ree.rne.es/
Sri Lanka, SLBC	www.slbc.lk
Swaziland, Trans World Radio	www.twr.org/
Sweden, Radio	www.sr.se/rs/english/
Syria, Radio Damascus	www.rtv.gov.sy/
Taiwan, Radio Taiwan Intl	http://english.rti.org.tw/
Thailand, Radio	www.hsk9.com/
Turkey, Voice of	www.trt,net.tr
UK, BBC World Service	www.bbc.co.uk/worldservice/
UK, Bible Voice BC	www.biblevoice.org/
UK, FEBA	www.feba.org.uk
UK, Sudan Radio Service	www.sudanradio.org/
Ukraine, Radio Ukraine Intl	www.nrcu.gov.ua/
USA, American Forces Radio	http://myafn.dodmedia.osd.mil/
USA, KNLS Anchor Point AK	www.knls.org/
USA, KTBN Salt Lake City UT	www.tbn.org/
USA, KWHR Naalehu HI	www.whr.org/
USA, Voice of America	www.voanews.com/
USA, WBCQ Monticello ME	www.wbcq.com/
USA, WBOH Newport NC	www.fbnradio.com/
USA, WEWN Vandiver AL	www.ewtn.com
USA, WHRA Greenbush ME	www.whr.org/
USA, WHRI Cypress Creek SC	www.whr.org/
USA, WINB Red Lion PA	www.winb.com/
USA, WMLK Bethel PA	www.wmlkradio.net
USA, WRMI Miami FL	www.wrmi.net/
USA, WTJC Newport NC	www.fbnradio.com/
USA, WWCR Nashville TN	www.wwcr.com
USA, WWRB Manchester TN	www.wwrb.org/
USA, WYFR/Family Radio Worldwide	www.worldwide.familyradio.org
Uzbekistan, CVC International	www.christianvision.com/
Vatican City, Vatican Radio	www.vaticanradio.org
Vietnam, Voice of Vietnam	www.vov.org.vn
Yemen, Rep of Yemen Radio	www.yemenradio.net
Zambia, CVC Intl/Christian Voice	www.christianvision.com/

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Monitoring the Hurricane Season

This month and next, mark the peak of the Atlantic hurricane season, and if the predictions are accurate, we should be in the middle of a busy season. The military is deeply involved with tracking these mammoth storms and managing the aftermath when they make a landfall. This month's *Milcom* column will let you get close to the action from your radio shack by monitoring the men and women who fly into these storms.

Before artificial satellites were used to find storms, the military units flew routine weather reconnaissance tracks to detect formation of tropical cyclones. While satellites can now perform this part of the mission, they still cannot directly measure the weather data inside these storms.

Hurricane Hunters are aircraft that fly into tropical cyclones in the North Atlantic Ocean and Northeastern Pacific Ocean for the specific purpose of directly measuring weather data in and around those storms. In the Western Pacific Ocean and Indian Ocean, the titles of Typhoon Chasers (Air Force) or Typhoon Trackers (Navy) are used for these organizations. In the United States, the Air Force, Navy, and NOAA units have all participated in this mission.

Because satellites cannot collect the weather data and ships are too slow and vulnerable, the only viable way to collect this information is with aircraft. The U.S. Air Force Reserve 53rd Weather Reconnaissance Squadron (WRS) flies instrumented WC-130J aircraft into storms to collect the required meteorological data. The area of responsibility for the "Hurricane Hunters" is midway through the Atlantic Ocean to the Hawaiian Islands. The 53rd WRS have also been tasked to fly into typhoons in the Pacific Ocean on occasion, as well as gather data in winter storms.

The 53rd WRS, better known as the "Hurricane Hunters," is a United States Air Force reserve squadron of aircraft based in Biloxi, Mississippi, that flies missions into hurricanes and weather systems for research purposes and observation.

The Hurricane Hunters of the Air Force are distinct from the National Oceanographic and Atmospheric Administration (NOAA) Hurricane Hunters. Based at the NOAA Aircraft Operations Center at MacDill AFB, in Tampa, Florida, the NOAA Hurricane Hunters use the WP-3D Orion and Gulfstream IV-SP aircraft for their weather missions.

The NOAA Hurricane Hunters mainly perform surveillance, research, and reconnaissance with highly instrumented aircraft, including airborne Doppler radar measurements in both Atlantic and Pacific storms.

Although satellite data has revolutionized weather forecasters' ability to detect early signs of tropical cyclones before they form, there are still many important tasks it is not suited for. Satellites cannot determine the interior barometric pressure of a hurricane, nor provide accurate wind speed information. This data is needed to accurately predict hurricane development and movement.

❖ Hurricane Hunter Aircraft

The WC-130J aircraft is a venerable workhorse of the hurricane hunting fleet. It flies directly into the hurricane, typically penetrating the hurricane's eye several times per mission at altitudes between 500 and 10,000 feet. The 53rd WRS Hurricane Hunters operate ten WC-130J aircraft (Table One has a complete list of the serial numbers) for weather reconnaissance and they use the callsign "Teal" when flying weather recon missions.

Table One – 53rd Weather Reconnaissance Squadron
WC-130J Aircraft

ICAO24 Code	Serial Number
AE0111	96-5300/Spirit of Gulfport: ex-N4232B
AE0112	96-5301: ex-N4107F
AE0113	96-5302: ex-N4161T
AE0114	97-5303
AE0115	97-5304
AE0116	97-5305
AE0117	97-5306
	98-5307
AE0259	98-5308
AE04A1	99-5309


Gust Probe

Another major player in hurricane tracking is the Department of Commerce NOAA aircraft fleet (see Table Two for a complete list of NOAA aircraft).

The Lockheed WP-3D Orion aircraft

Table Two – Current NOAA Aircraft Fleet

Callsign	Aircraft Type Registration No	Aircraft Code/Selcal	ICAO24
NOAA 42	WP-3D Orion	N42RF	A4FAC3/LM-BF Selcal
NOAA 43	WP-3D Orion	N43RF	A52242/LM-CF Selcal
NOAA 44	P-3C Orion	N44RF	A549C1
NOAA 45	Gulfstream Jet Prop Commander 1000 (695A)	N45RF	A57140
NOAA 46	Dehavilland DHC-6-300	N46RF	A598BF
NOAA 47	Rockwell Aero Commander 500-S	N47RF	A5C03E
NOAA 48	Dehavilland DHC-6-300	N48RF	A5E7BD
NOAA 49	Gulfstream G-IV	N49RF	A60F3C/JQ-GS Selcal
NOAA 51	Rockwell Aero Commander 500-S	N51RF	A66093
NOAA 52	Cessna Citation II (CE-550)	N52RF	A68812
NOAA 56	Dehavilland DHC-6-300	N56RF	A7260E
NOAA 57	Dehavilland DHC-6-300	N57RF	A74D8D
NOAA 64	Aerofab Lake Seawolf LA-27	N64RF	A8645F

flown by the NOAA Hurricane Hunters are heavily instrumented flying laboratories, specifically modified to take atmospheric and radar measurements within tropical cyclones and winter storms.

The NOAA G-IV Gulfstream high altitude jet conducts hurricane surveillance flying upwards of 4000 miles each flight to document upper and lower level winds that affect the movement of tropical cyclones. The hurricane models (computer models predicting hurricane tracks and intensity) mainly utilize NOAA G-IV dropsonde wind data that is collected both day and night in storms affecting the United States and its territories.

Other aircraft have been used to investigate hurricanes, including an instrumented Lockheed U-2 that was flown in Hurricane Ginny during the 1963 Atlantic hurricane season.

Past aircraft used were:

A-20 Havoc, 1944
B-24, 1944-1945
B-17, 1945-1947
B-25, 1946-1947
B-29, 1946-1947
WB-29, 1951-1956
WB-50, 1956-1963
WB-47, 1963-1969
WC-121N 1954-1973
WC-130A,B,E,H 1965-2005

❖ Hurricane Katrina

The landfall of Hurricane Katrina on August 29, 2005, caused devastating damage to Keesler Air Force Base, the home base of the 53rd Weather Reconnaissance Squadron. The equipment and personnel of the squadron had to be moved due to the destruction at Keesler and they were flying out of Dobbins Air Reserve Base near Atlanta. Despite heavy losses, the squadron never missed a tasked mission from the National Hurricane Center. The 53rd has since returned to Keesler and is once again flying weather reconnaissance missions from the base.

❖ Hurricane Hunter Frequencies/Callsigns

There are three frequencies officially listed for the 53rd WRS. These frequencies are used for air-to-air communications and coordination.

53rd Weather Reconnaisance Squadron

VHF	123.050 MHz	primary
UHF	304.800 MHz	secondary
HF	4701.0 kHz	USB

The first two are line of sight frequencies and the aircraft will have to be fairly close to your location, depending on altitude, in order to hear their communications. I keep these frequencies in my scanner year round and occasionally hear some interesting chatter on the VHF/UHF frequencies listed above.

The best place to catch hurricane hunter communications in the HF spectrum is on the US DoD High Frequency Global Communications System (HFGCS). The HFGCS is a worldwide network of 15 high-power HF stations providing air/ground HF command and control radio communications between ground agencies and US military aircraft and ships, Allied military, and other government aircraft. This global network provides automated and operator-assisted voice services, data transmission, and an HF e-mail capability that has an interface to both the classified and unclassified email networks.

Hurricane Katrina devastated the Gulf Coast region of the United States almost three years ago. Communication into and out of the area was non-existent in many areas where troops were deployed for recovery efforts in the aftermath. Data transmission is vital during a crisis, and the HF e-mail capability of HFGCS was an integral part of the military response effort to that disaster. For instance, the Civil Air Patrol used HFGCS as a primary communications medium to get data transmitted out of the Gulf area. Engineers were able to modify the system configuration in order to bring that vital capability to CAP.

Normally, if an Air Force hurricane hunter or NOAA mission needs to make HF contact with ground stations, they will check in on one of the primary HFGCS frequencies first. Those frequencies are (USB mode):

HF Global Communications System (USB)

8992.0	11175.0 kHz	24 hours
13200.0	15016.0 kHz	Day
4724.0	6739.0 kHz	Night

Once communications has been established on one of the frequencies above, the net control station located at Andrews AFB, Maryland, will usually move the aircraft off to another frequency (discrete) for extended operations, including official traffic and phone patches, usually media interviews.

Regular monitors of this network should be aware that Keflavik, Iceland, and Thule AB, Greenland, have both closed down. Also, unofficial information has indicated that the administrators of this network are looking to place remote station in the Middle East and Australia. No further information is available on this at presstime.

The loss of the station at Keflavik was a major loss to the network coverage area. Some of the innovative solutions to replace this station and its coverage area include: transmit/receive sites on oil rigs, depending on Navy ships for coverage, building a new station in Maine, collaboration with Canada for use of an east coast site, or dedicating some log periodic antennas at Andrews and Croughton to fill in the coverage.

Another network on which to watch for hurricane hunter activity is the HFGCS Automatic Link Establishment (ALE) network. Program the following frequencies and be sure to use your ALE program to identify the various stations in the net. Remember, from this network aircraft can dial station direct, so this may be another area rich in hurricane hunter activity.

HF Global Communications System (ALE)

Frequencies (ALE/USB):

3137.0 4721.0 5708.0 6721.0 9025.0 11226.0 13215.0 15043.0 18003.0 23337.0 kHz

Primary Ground Stations/ALE Addresses

Address	Station
ADW	Andrews AFB, Maryland
AED	Elmendorf AFB, Alaska
CRO	Croughton AB, United Kingdom
GUA	Anderson AFB, Guam
HAW	Ascension Island
HIK	Hickam AFB, Hawaii
ICZ	Sigonella, Sicily, Italy
JDG	Diego Garcia
JNR	Salinas, Puerto Rico
JTY	Yokota AB, Japan
MCC	McClellan, CA (Station McClellan renamed West Coast)
MPA	South Atlantic (Mount Pleasant, Falkland Islands)
OFF	Offutt AFB, Nebraska
PLA	Lajes AB, Azores

You should also keep an ear out for possible Hurricane Hunter activity on the Eastern Test Range network. This is a backup network for the Global system above and the net control is Cape Radio (Cape Canaveral, Florida). This net uses 10780 kHz USB as a primary and 20390 kHz USB as a secondary frequency.

One of the U.S. Air Force MARS voice networks has also been used in the past for Hurricane Hunter operations and phone patch traffic (Mode USB).

USAF Military Affiliate Radio Service

Designator	Frequency (kHz)
RK	4557.0
ACJ	7633.5
ACB	13927.0
ACF	14606.0
???	18617.0
ACR	20992.5

And finally, according to the latest National Hurricane Operations Plan, the callsigns associated with this year's hurricane operations will be as follows:

2008 Hurricane Hunter Callsigns

NASA ##	NASA Research Aircraft
NOAA 42-44	NOAA Aircraft Operations Center
Teal 70-79	53rd WRS
Warlock 587	Naval Research Laboratory/ VXS-1 NP-3D (#154587)

And that will do it for this month. Remember, you can get the latest updates, including military, hurricane freqs and much more on my two blog pages on the Internet (URLs listed below). So until next time, 73 and good hunting.

MILCOM-HURRICANE HUNTER RESOURCE GUIDE

Btown Monitoring Post - **http://monitor-post.blogspot.com/**
Hurricane Hunter webpage - **www.hurricanehunters.com/**
Milcom Monitoring Post - **http://mt-milcom.blogspot.com/**
National Hurricane Center Aircraft Reconnaissance webpage - **www.nhc.noaa.gov/reconlist.shtml**
National Hurricane Operations Plan - **www.ofcm.gov/nhop/08/pdf/Entire_NHOP_2008.pdf**
Tropical Cyclone Plan of the Day (TCPOD) - **www.nhc.noaa.gov/ftp/pub/forecasts/recon/MIAREPRPD**

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What's in a Callsign?

WTMJ. KOB. K21OD. CKND-TV-2. XETRA. In North America, every broadcast station has a callsign. Where do they come from? Why are they assigned? Why are only certain combinations possible? What is a callsign and why do stations have them?

Call letters were first officially assigned to U.S. ships in 1912. Some vessels were already using self-assigned callsigns. (Imagine having to send "BOSTON SHORE STATION, THIS IS RMS TITANTIC CALLING, OVER" in Morse Code. "FBN DE MGY K" makes a lot more sense!) Allowing government to take over the assignment ensured there would be no duplicate calls.

Callsigns are of course necessary for the efficient operation of point-to-point radio stations. They are not necessarily as important for broadcasting stations. Indeed, most of the world's countries do not assign call letters to broadcast stations; in other countries, calls are assigned but never used on the air. I think many countries use call letters for record-keeping purposes only.

In the U.S., when a new full-power or LPFM station receives its construction permit, it may request call letters. LPTV stations, Class A TV stations, and translators are automatically assigned number-letter calls like K21OD or W271AB when their permit is issued. LPTV and Class A stations may request the assignment of all-letter calls like WNPX-LP to replace their automatically-issued number-letter calls.

All U.S. broadcast callsigns start with the letter K (if the station is west of the Mississippi River) or W (if it's east of the river).

FM and TV stations may request a suffix – FM or TV – on their call letters. If a station exists with the same letters in a different service, the FM or TV suffix is obligatory. For instance, if there's already a WDMP, an FM station wishing to use the WDMP call letters must use the -FM suffix, becoming WDMP-FM.

Suffixes are also obligatory for many low-power stations. LP is required for LPFM stations and for analog LPTVs with all-letter callsigns. (Since number-letter calls are only assigned to low-power stations, the LP suffix is not used with these stations.) LD is required for digital LPTVs with all-letter calls; D is used for digital LPTVs with number-letter calls. CA and CD are used for analog and digital Class A stations respectively (even for those few Class A stations with number-letter calls). For quite some time the DT suffix has been obligatory on digital TV stations, but the Commission seems to have stopped this practice.

In Canada, the CF, CH, CI, CJ, and CK call blocks are available for broadcast stations. CB is also available for CBC stations through special arrangement with Chile. VF is also used for low-power FM relay stations. The FM and TV suffixes are obligatory for all such stations in Canada, except for most CBC TV stations (which use a "T" as the last letter instead) and low-power FM and TV relay stations. DR is used for digital radio stations, and DT for digital TV.

In general, a station that is a 100% relay of another station takes the calls of the station it relays and appends a number. CFGW-FM-1 is a relay of CFGW-FM. If the number comes before the -FM, the station being relayed is AM: CBW-1-FM is a relay of CBW 990 AM. A station (usually TV) that relays all the programs of another station but sometimes airs different commercials gets its own call letters. CBWGT relays CBWT Winnipeg, but inserts its own commercials. There are numerous exceptions....

In Canada, stations may request call letters when they apply for a permit. This results in the confusing situation of more than one set of calls being assigned to the same frequency in the same city – as I write this, there are three different sets of calls on 104.1 in Vancouver: CJJN-FM, CJVY-FM, CKPK-FM. At least two of the three will be deleted.

Mexican AM stations get calls beginning with XE. FM and TV stations get XH prefixes, though some older stations have been grandfathered in with XE calls. In the U.S. a full-power station gets a four letter callsign; in Canada it gets four or five; but in Mexico I've seen as many as six letters in a station callsign. You may occasionally see reference to Mexican calls starting with something other than XE or XH, but these are actually promotional slogans and not call letters.

A well-known Mexican station has recently changed its call letters. For decades, AM 690 in Tijuana has been known as XETRA. The station was sold last year and switched languages; after having broadcast in English for decades, it's reverted to Spanish-language programming. With the language change comes a callsign change to XEWW.

More recent call letter changes are listed in the sidebar.

❖ Digital Radio news

Radio Netherlands' *Media Network* blog is reporting the Mexican government agency CoFeTel has authorized stations within 320km of the U.S. border to begin using IBOC/HD Radio. The permission applies to both AM and FM stations. Stations must request CoFeTel permission first.

The iBiquity website lists 14 countries testing HD Radio (not counting the U.S. and Mexico, where IBOC has gone beyond testing and is allowed for regular operation). An ambiguous story suggests Thailand may also have regular HD broadcasts.)

However, after testing in France, that country's Ministry of Communications has removed IBOC from its list of technologies under consideration.

An Indonesian AM station reports considerable success with IBOC tests in that country. On the other hand, the station had to purchase not only the 1062 kHz frequency on which its HD broadcasts are run, but the frequencies on either side (1053 and 1071) where the digital sidebands exist.

Here in the USA, WINS-1010 New York City has added IBOC. It's the only major AM station to do so recently. Radio Shack had a stack of HD Radios on sale at the Dayton Hamvention. It looks like they may have sold two of them.

❖ Digital TV news

Wilmington, North Carolina, has agreed to become a test bed for the upcoming shutdown of analog over-the-air television. Six of the city's seven TV stations have agreed to shut down their analog signals on September 8th. This includes three low-power stations. The one remaining analog signal will be PBS station WUNJ-39, part of a statewide network.

FCC officials hope the shutdown in Wilmington will show how effective the DTV

The base of the WBIR-TV tower in Knoxville, Tennessee, shows two horizontal towers used to support feedlines going into the transmitter building.

educational program has been and how well DTV reception coverage replicates analog coverage. I suspect massive local publicity will warp the success rate there.

Reader Bob Paciorkowski asks, "When the cable provider downconverts the digital TV signal to analog, what will the picture look like? Will it be in the 16:9 aspect? Or will the picture fill my TV screen?" That's a good question, and the answer is, "It depends"...

There are several ways you can downconvert a 16:9 signal to 4:3 for an analog TV:

- You can fill the screen from left to right, leaving black bars at the top and bottom. ("letterboxing")
- You can fill the screen from top to bottom, chopping off the left and right edges of the 16:9 picture.
- You can split the difference.

The first option ensures analog viewers see the entire picture, but they waste a lot of their screen space (especially when a 4:3 program is being broadcast, in which case there are black bars on all sides of the picture). The second option uses the entire analog screen but the viewer doesn't see what's happening at the edges of the picture.

It's hard to say which option Bob's local cable operator will take. It is possible his local TV stations will do the downconversion themselves, in which case, different channels may use different methods!

In Colorado, four major Denver stations are *finally* on the air with full-power digital signals. Construction had been stalled for several years, as locals tried to prohibit construction of digital transmitters at the site. (This is even though construction would result in most of the towers on the site being dismantled and the stations consolidated on a single tower.)

❖ CBA-1070 gone: Pictures

Last month we reported on the demise of 50,000-watt CBA-1070 in the Canadian Maritimes. This month we have links to a few photos shot on the station's last day. There's also a 4-minute audio story on the shutdown of the AM transmitter. See the links in the sidebar.

❖ CBU-690 *not* going away

We thought another CBC AM station was going to go away. CBU Vancouver had filed to move to 88.1 FM, also adding FM transmitters on Gabriola Island and in Nanaimo. That move has been (mostly) denied. The 88.1 transmitter was approved, but the two FM relays were not.

Regulatory officials assigned the requested frequencies to two commercial applicants instead, feeling they could make better use of the scarce channels. They also felt the three FM stations would not adequately replicate the coverage of the 50,000-watt AM transmitter. The single FM transmitter certainly won't fill the AM coverage area; the application to close AM 690 has been denied and the station will remain on the air.

Another Vancouver AM station, CKBD-600, *will* be going away.

❖ Going away – and popping up elsewhere

The long-haul moves we've noted on AM lately are now showing up on FM. KDAI-89.1 Scottsbluff, Nebraska, has filed to change frequency to 91.9, decrease power, and move from 41-50N/103-50W to 39-16N/120-54W. Any geography experts reading this column will realize that's a pretty big move! In fact, the station wants to move to Foresthill, California, near Yuba City.

A few other such long-haul FM moves have also been filed by non-commercial applicants trying to work around the FCC's new 10-new-stations-to-an-applicant policy. A long move, though not quite as long, has been completed in Oregon, in which KNRQ-97.9 is moving from Eugene to the Portland suburb of Tualatin.

❖ 'Till next month

Tower hunters visiting the Great Smoky Mountains National Park this summer may want to make a detour to Sharp Ridge Memorial Park in Knoxville. There, you can get as close as safety allows to several large towers, many with interesting configurations. See the base of the WBIR-TV tower in this month's column.

Did you find any interesting towers this summer? Write me at 7540 Highway 64 West, Brasstown NC 28902-0098, or by email to *dougsmith@monitoringtimes.com.* Good DX!

URLs IN THIS MONTH'S COLUMN:

http://americanbandscan.blogspot.com - My AM DX blog.

http://cbc.ca/informationmorningmoncton/media/2008040800032ebb.ram
A 4-minute radio story on the closure of CBA-1070.

www.cbc.ca/informationmorningmoncton/events.html
Photos of the CBA site and the engineer turning the AM transmitter off.

http://blogs.rnw.nl/medianetwork/mexico-authorizes-transition-to-hd-radio%E2%84%A2-for-stations-within-320-km-of-us - RNW Media Network blog entry on Mexican HD Radio

www.ibiquity.com/international/select_your_country - HD Radio overseas

AMERICAN BANDSCAN STATION REPORT

NEW:

New station permits granted

Prescott, Ariz.	1300	1,000/250 DA-2
Grand Junction, Colo.	730	2,000/250 DA-2
Keystone, Colo.	1320	1,000/500 DA-2
Kirk, Colo.	1490	250/250 ND
Silt, Colo.	1490	1,000/1,000 ND
Wendell, Idaho	1340	250/250 ND
Vanderwagen, N.M.	1490	250/250 ND
Little Falls, N.Y.	1120	1,500/250 DA-N
Milford, Penna.	1450	1,000/1,000 ND
Gloverville, S.C.	1300	2,500/820 DA-2
Manor, Texas	1120	250/153 DA-2
Bon Air, Va.	1200	50,000/10,000 DA-2

New station applications denied

Hilo, Hawaii	1450	
Jolivue, Va.	1490	

Amendments to applications for new stations

Bandon, Ore.	800	application for new station amended from 770kHz; power to 2,500/1,000 DA-2

CHANGES:

Stations granted moves to new frequencies

Vancouver, B.C.	600	CKBD	to 100.5 FM
Mineral Wells, Texas	1110	KJSA	from 1120; power to increase to 20,000 watts directional, daytime only

Stations granted moves to new cities

Nahant, Mass.	1230	WESX	from Salem; power to 450 watts

Stations requesting moves to new cities

Oak Park, Mich.	1600	WAAM	from Ann Arbor; power to 15,000 watts

Stations deleted

Shamokin, Penna.	1480	WISL	
Halifax, N.S.	920	CJCH	(moved to 101.3 FM)

Callsign changes

Eagle River, Alas.	1020	KABA	from KAXX
Wasilla, Alas.	1430	KMBQ	(new station)
Fort Smith, Ark.	1320	KWHN	from KYHN
Fort Smith, Ark.	1650	KYHN	from KWHN
Fresno, Cal.	1680	KGED	from KAVT
Sacramento, Cal.	1240	KRJY	from KSAC
Santa Paula, Cal.	1400	KKZZ	from KUNX
Ventura, Cal.	1590	KUNX	from KKZZ
Pueblo, Colo.	1350	KDZA	from KGHF
Ewa Beach, Haw.	1320	KEWA	(new station)
Cocoa Beach, Fl.	1300	WMEL	from WTIR
Melbourne, Fl.	920	WDMC	from WMEL
Winter Garden, Fl.	1680	WOKB	from WLAA
Winter Garden, Fl.	1600	WLAA	from WOKB
Meridian, Idaho	890	KXSL	from KDJQ
Monroe, La.	540	KMLB	from KNOE
Westbrook, Me.	1440	WJJB	from WJAE
Petoskey, Mich.	750	WARD	from WLDR
Austin, Minn.	970	KQAQ	from KNFX
Dilworth, Minn.	1100	KKFL	from WZFN
St. Louis, Mo.	1430	KZQZ	from WIL
Little Falls, N.Y.	1120	WKAJ	(new station)
Dallas, N.C.	960	WCRU	from WZRH
Johnstown, Penna.	850	WKGE	from WNTJ
Milford, Penna.	1450	WQCD	(new station)
York, S.C.	980	WULR	from WBZK
Ashland City, Tenn.	790	WLNU	from WQSV
Moneta, Va.	880	WSLK	from WCQV
Grafton, W. Va.	1260	WVUS	from WTBZ
Big Horn, Wyo.	1370	KHNY	(new station)

ND: non-directional
DA-N: directional at night only
DA-D: directional during daytime only
DA-2: directional all hours, two different patterns
DA-3: directional day, night and critical hours, three different patterns

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Airline Company Frequencies

Listening to, figuring out, and trying to log all the Company Frequencies in a given geographic area is one of the specialty pursuits within the aero listening hobby that presents its own fascinations and challenges.

Within the 118-137 MHz VHF aircraft band, the 128.825 - 132.00 MHz and 136.500 - 136.975 MHz sub-bands are allocated to Aeronautical Operational Control (AOC) communications. Like the other VHF aero frequencies in the U.S., they are spaced every 25 kHz.

Much of what can be heard in these ranges is on what are commonly known to hobby listeners as "Company Frequencies" where airliners and air cargo carriers communicate with their offices at airports. They are licensed by the FCC but managed by Aviation Spectrum Resources, Inc. (ASRI) **www.asri.aero** and formerly by ARINC.

The two ranges provide 128 and 20 discrete frequency allocations respectively, to which you can apply your listening and detective skills. Let's get started!

❖ What might you hear?

The terminal area / "in-range" message content can be about variety of things other than Air Traffic Control or personal messages.

Arriving aircraft will give an estimated arrival time, which refers to the "gate" (parking spot for passenger loading / deplaning), not to touchdown.

Messages may be as simple as "*5737, ten out, and no specials*," or "*Santa Rosa, 475, see you at 26 past the hour*," or pilots may also request such things as fuel, "lav service," "a bug wash," specific supplies, accommodation for special passenger needs, flight crew scheduling info, law enforcement to meet suspicious or unruly passengers, maintenance for any number of things from avionics to a soiled seat, and more.

For comedy and drama on the aero bands, company freqs are your best bet. (Photo by Rachel Baughn)

Some frequencies have special uses like Ramp Control. At Sacramento International (KSMF) on 131.7, for example, you might hear a Southwest Airlines pilot say something like "*3408 on the ground*" to which Ramp Control would respond "*3408, welcome to Sacramento, see you at 13*" meaning assigned Gate 13.

Departing flights of some airlines call in within ten minutes after takeoff. Their transmissions are brief and they may say something like "*eighteen, twenty-nine, six point six*." In this case, it is push-back minutes after the hour, wheels-up minutes after the hour, and on-board fuel in thousands of pounds. Not all airlines report in – at least not in the same way. Some may even include passenger count and pilot-in-command. "Push back" is when a special airport vehicle pushes the aircraft back away from its gate prior to the plane using its own power to move forward.

Enroute (non-terminal-area) communications is generally above 10,000 feet. Some drama can be tossed in at times by including requests for help with passenger or crew medical concerns or to resolve urgent safety-of-flight situations like selecting an alternate airport due to bad weather, "auto-pilot keeps disengaging," onboard smoke or burning smell, "rudder trim problem," etc.

The comms relating to problems for which an in-flight resolution is being sought are routed to ground maintenance people or, for medical consultations, to MedLink **www.medaire.com/comm_medlink.html**. These types of communications are perhaps more common on the ARINC VHF Network mentioned below.

❖ Call Signs / Flight Numbers

On an Air Traffic Control (ATC) frequency, "Southwest 306" is an example of a spoken call sign and, in this case, its flight number. Each airline has a three-letter code for the company name and the one for Southwest Airlines Co. is "SWA." That is followed by the same three numbers producing the written flight number of SWA306.

Sometimes it is more cryptic, such as, Virgin America, Inc. uses "Redwood" as a radio call. On an ATC frequency, an example would be "Redwood 468" and written as VRD468.

FlightAware's Fleet list **http://flightaware.com/live/fleet/** shows the three-letter airline codes, the full airline names, and the radio calls shown in quotes.

❖ Company Aircraft ID

Aircraft on Company Frequencies identify a little differently from what they do on ATC frequencies and it can be a bit more of a challenge. Let's say you live in range of the air traffic to and from Reno/Tahoe International Airport and you hear an aircraft initiate a communication on 132.0 by saying "Reno 255" – but no mention of the airline name. Detective work reveals that the aircraft is calling Horizon Air Operations or "Ops" at that airport and the "255" are the numerals of the Horizon flight number.

To keep things interesting, sometimes the pilot will make a call like "Sacramento 553," and, again using Horizon Air as an example, it is really 2553 (Flight number QXE2533). So, keep in mind that sometimes the first digit of a four-digit flight number may be omitted by the pilot.

❖ Detective Tools

To systematically pursue Company Frequency listening and logging, it is almost essential to know what flights are departing from, awaiting to depart, arriving, and have arrived at given airports. There are various sources of such information, but one stands out for completeness, ease of use, and flight path graphics. It is FlightAware **http://flightaware.com** and it is free.

FlightAware search boxes - and in this case showing the use of "XXX" when searching for a flight when the airline name is not known, see text. Logo and image Courtesy of FlightAware (flightaware.com)

If you don't know the four-letter code for a particular commercial airport (which is the three-letter code preceded by "K" – to indicate the United States), go to FlightAware and at the bottom of the "Airport Code" box, click on "Don't know the airport code?" Type in the airport name or the city. At some point, a small box will open offering airport suggestions. The results are displayed as active links which when followed show activity at the listed airports. The

Airline route maps can be interesting and also provide a quick reference to airports served by a given airline. Courtesy of Midwest Airlines.

airport codes are included.

If you were in range of the air traffic at San Francisco International (KSFO) and heard "San Francisco 764" call-up on 130.925 but you didn't know what it was, you would go to KSFO via FlightAware and look at all the flight numbers with "764." In this case, VRD764 might be listed in the "En Route/Scheduled to KSFO" column as "VRD764 A320 McCarran Intl (KLAS)."

Then, click on that flight number link to see a graphic of the flight progress and information about the flight. If the listed time is consistent with your time of reception, you can be reasonably sure of a valid log entry for Virgin 764 / VRD764 at San Francisco on 130.925.

Another very useful tool, using this same example, would be to go to FlightAware's "Flight/Tail #:" search box and enter "xxx764." Such a search will bring up all airline flights using 764 – and that includes all four-digit flights starting or ending with those three digits.

Yet another tool is to use FlightAware's Fleet capability **http://flightaware.com/live/fleet/** which lists and graphically shows an airline company's airborne flights. Go there and play around. Start with smaller airlines such as VRD and QXE to get the hang of it. You will note that, due to space limitations, only some flights will have data blocks accompanying them. Also, the airport IDs come and go over time, so not all airports being served by any particular airline will be present all of the time.

❖ FlightAware Delay

Do keep in mind that FlightAware information, and that of similar providers, is delayed by at least five minutes and often a little longer. Their source is an "ASDI Class 2" delayed feed rather than the "Class 1" real-time feed used by professionals in the industry. Our government insists on the delay for data released to the public for supposed security reasons.

Arriving planes are still shown in flight after they have landed. Departing planes do not appear airborne on Live Flight Tracker until after the delay. In any case, FlightAware is an outstanding resource for aircraft listeners.

❖ Airport-Related Websites

It can be helpful, as part of your detective work, to use Google **www.google.com** to find airport internet websites of interest by entering the airport name. Airport websites usually say what airliners, cargo carriers, charter, and other aircraft serve the airport. This information can offer a heads-up for what you might want to attempt to hear.

As an example, go to Portland International Airport (KPDX) at **www.flypdx.com** and click on "Airline Information" at the left to see the airlines list and again further down on the left on "Cargo Services" to see a list of air cargo carriers that serve the airport. Company websites vary in the extent of info they offer and the ease of access to that info.

Gate assignments are called out on some of the Company Frequencies. Here and there, official and unofficial airport websites provide gate number diagrams. This unofficial site for Kennedy International Airport (KJFK) **www.jfk-airport.net/terminal-1.html** shows them (see on the right for links to other terminals). The official site for JFK does as well **www.panynj.gov/CommutingTravel/airports/html/kennedy.html**

❖ Airline Websites

Airline websites vary considerably; some are quite interesting and even have good photos.

In many cases, you can go to airline and cargo carrier websites to see what airports they serve. **Www.landings.com/_landings/pages/commercial.html** has links to airline and charter companies worldwide. **Www.landings.com/_landings/pages/cmrl/commercial-cargo.html** provides the same for air cargo websites.

FlightAware also links to airline company websites. Bring up an individual flight for a selected airline and then near the middle top, in white on gray, right after the flight number is "(web site)." That is the link to the airline website.

Airline and air cargo route maps, found on some company websites, or at **www.airlineroutemaps.com/USA/index.shtml**, can be helpful to quickly spot locations that are served by a given carrier. Lists of destinations are also helpful, but seeing the routes graphically adds something.

❖ Frequency Lists

There are apparently no official on-line Company Frequency lists that associate airlines by name with frequencies and airports. Neither the FCC nor ASRI makes them available. This makes Company Frequency listening and logging a pursuit that requires detective work – and that's the fun of it.

There are lists on the internet created by listeners in different metro areas which can be helpful. Use Google and some imagination in your searches and you will find them. The lists show airline and air cargo company frequencies. There is no guarantee that they will work for an airport near you, but they are worth a try for starters.

AirNav.com can be a good resource at some airports for Fixed Base Operators (FBOs). Go to **www.airnav.com/airport/KVNY** as an example, and scroll down to "FBO, Fuel Providers, and Aircraft Ground Support." There, you will see ASRI 128.85, ASRI 130.35, ASRI 131.50, ASRI 130.575, ASRI 129.075 for various FBOs. At **www.answers.com/topic/fixed-base-operator** FBOs are explained briefly.

❖ ARINC VHF Network

By way of agreements, corporate jet, airliner, and air cargo companies may use the ARINC-1 VHF Radio Network with more than one hundred ground stations in the U.S. It is often used when an aircraft is out of radio range of one of its own airline company offices at an airport.

"San Francisco" is the control operator except for frequencies 129.9 and 130.7 for which "New York" is the control operator.

See the ARINC-1 VHF Radio Networks map. Go to **www.arinc.com/products/voice_data_comm/** and click on "Air/Ground Domestic Voice Service" on the left, then on "Jeppesen Charts," and then on "ARINC-1 VHF Radio Networks," for a 3.1 MB PDF download.

❖ ACARS

Aircraft Communication Addressing and Reporting System (ACARS) is a digital form of Company Frequency communication. As you sort through the voice frequencies, you may encounter one or more frequencies with only short digital bursts, such as on 131.55, which would be ACARS.

ACARS can be decoded using your computer. **Www.acarsonline.co.uk/about/acars-faq/** is a good place to start for ACARS info.

There has been an ongoing move to ACARS from voice, but lots of voice traffic still exists on the Company Frequencies for you to hear and log. Good luck with it, and see you next time.

Kevin Carey, WB2QMY
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Essentials for LW Success

Years ago, the biggest challenge to getting on longwave was just being able to tune in the band. Receivers with LF coverage were rare (at least here in the U.S.), and when you could find one, it often covered only a narrow range of perhaps 150-400 kHz.

In those days, the typical route to getting on the band was with surplus gear or a longwave *converter*. Converters work by shifting the LW band to a range that the receiver can tune. The range of 3510-4000 kHz is popular, although other ranges are also used.

Today's Options

A converter is still a great way to get an older receiver on longwave or for extending the lower reach of your receiver. You simply connect the converter between your antenna and the receiver's input. No modifications are needed, and you retain all of the features of your receiver (S-meter, filters, noise limiter, etc.), which can be applied to the longwave signals.

Most receivers made in the last 15 years include longwave coverage as standard, down to at least 150 kHz. Some go much lower. The selection of new tabletop receivers is somewhat limited at present, so don't rule out picking up a good used receiver if you want to have a standalone rig. The Drake R8 series, Icom R75, Kenwood R-5000, and Yaesu FRG-100 are all good choices for getting into longwave. These units are also very capable on the shortwave bands.

Hamfests, online auctions, used equipment vendors, and classified ads are all good places to look for "pre-enjoyed" equipment. Want to know more about a particular model? Universal Radio's page at **www.dxing.com/rx.htm** contains photos and specifications for many popular receivers. Be sure to check this valuable reference before you go shopping for any "legacy" gear.

Hamfests are a good place to find used receivers and accessories

Antennas

Once you have your receiver, an effective antenna is the next order of business. While any hank of wire will allow you to pull in a few signals, you'll quickly find that a specialized design for longwave will provide better performance and pick up less man-made interference. Air-wound loops, ferrite loops, and active antennas are all good choices, depending on whether or not you want directivity or an omni-directional reception pattern.

LF Engineering Co. (**www.lfengineering.com**) and Radio Plus+ Electronics (**http://dxtools.com**) are two commercial sources for longwave antennas. Homebrew construction is also possible. Simply do an online search for "active antennas" for a wealth of ideas.

Online & Printed Resources

Before going too far, you'll want to get a listing of longwave beacons. While you can identify some beacons by looking through back issues of *MT*, this becomes more difficult as your list grows. There are some Internet sites that can help you identify beacons – **www.navaids.com** is a one place to start – but I've yet to find a single website that lists all U.S. and Canadian beacons. In some cases, the crucial two-letter "compass locator" beacons are omitted, or a site will focus on one country or another.

While websites are helpful, I prefer to have a *printed* guide handy for serious DXing. Besides, who wants to have a potentially noisy computer running next to their receiver when trying for an elusive 25-watt beacon four states away? If you are interested in a printed guide, I encourage you to check out the *BeaconFinder II*, which I began publishing for hobbyists in 1998. Now in its 7th printing, it lists the majority of longwave stations that can be heard in North America. You'll find the guide listed elsewhere in this issue of *MT*.

A handy FAA publication is the *Airport/Facility Directory*. These booklets can be obtained from the pilot shops at many airports and are a useful resource for longwave monitoring. Each *Airport/Facility Directory* covers a specific region of the USA and is updated several times per year as changes warrant. You might want to see if your local airport has any obsolete copies they can part with, although purchasing a new one at around $4.55 will not set you back too far. One source for online ordering of this publication is **www.sportys.com/pilotshop/charts/afd.cfm**.

❖ Loggings

Dick Palmer, W7KAM (AZ) submitted the logs shown in Table 1. Dick uses an ICOM R75 receiver, a Timewave DSP599zx Audio Noise Filter, and a homebrew active antenna mounted 13-feet high. He notes that receiving conditions have not been good at his station, with high static levels on the band. Still, he has managed to pick up seven new beacons this year, bringing his yearly total to an impressive 745 beacons!

Table 1. Selected Beacon Loggings

FRQ	ID	ST/PR/ITU	CITY	Date/Time
206	PWT	WA	Bremerton	05/09 1146
214	CHX	MEX	Choix	05/02 1202
219	GAV	AK	Gustavus	05/08 1003
222	CUW	MEX	Chihuahua	05/08 1010
233	ALJ	AK	Johnstone Pt.	05/02 1202
233	VHN	TX	Van Horn	05/09 1120
238	KT	NZL	Kaitaia	05/17 1146
254	SM	NT	Fort Smith	05/20 1017
260	NF	NFK	Norfolk Island	05/03 1156
270	FA	SMO	Faleolo	05/17 1149
280	IPA	PAQ	Easter Island	05/02 1208
283	DUT	AK	Dutch Harbor	05/02 1210
284.5	MH	TUA	Manihi Atoll	05/02 1213
316	MAJ	MHL	Majuro	05/09 1210
332	POA	HI	Pahoa	05/02 1217
332.5	AA	TUA	Anaa	05/17 1256
349	TP	TUA	Takapoto	05/08 1203
353	LLD	HI	Lanai	05/01 1010
353	NH	MAR	Nuku Hiva	05/17 1200
362	CYW	KS	Clay Center	05/26 0730
368	GYM	MEX	Guaymas	05/01 0231
382	GRN	MEX	Guerrero Negro	05/22 1200
390	HBT	AK	Sand Point	05/08 1211
400	ENS	MEX	Ensenada	05/03 1216
415	CBC	CYM	Cayman Brac	05/13 0301
415	LO	MT	W. Yellowstone	05/13 1126

For a complete list of ITU codes, see **www.wordiq.com/definition/ITU_letter_codes**

❖ Snap, Crackle, Pop

Want to know where lightning is occurring, or has occurred recently? Check out this interesting site forwarded to us by Jacques d'Avignon, VE3VIA (ON): **http://webflash.ess.washington.edu/**

❖ Up the Dial...

Want to try for beacons a little higher in the spectrum? You will find an extensive list of 10-meter beacons (28.115-28.200 MHz) on the 10-10 International website at **www.ten-ten.org/**. Many of these run very low power, so they are an interesting challenge for beacon hunters. A similar list of 6-meter (50 MHz) beacons may be found at **www.keele.ac.uk/depts/por/50.htm**.

Happy hunting!

George Zeller
georgezeller@monitoringtimes.com

Atlanta Braves Baseball on Pirate Radio Stations

It's a little bit of a stretch, but two pirate stations are publicizing the fact that they are members of the Atlanta Braves baseball radio network. Pirate Radio 930 and 1250 in North Carolina have accomplished this feat while broadcasting with a license. The transmitters use 5000 watts for **WDLX** on 930 kHz from Washington, NC and for **WGHB** 1250 kHz from Farmville, NC. Sports and talk dominate their programming schedule.

Using a slogan of "Pirate Radio 1250 and 930, the Voice of the Pirate Nation," these two medium wave stations are operated by Pirate Media Group, LLC. Both stations have studios at 525 Evans Street in Greenville, NC. You can check out their web site at **www.pirateradio1250.com/** on the internet.

Greenville is, of course, the same city that hosts the main international broadcasting shortwave transmitter complex operated by the **Voice of America.** Ironically, the **Voice of America** caused the abandonment of the old 7415 kHz North American pirate broadcasting frequency when it began using 7415 kHz from its Botswana relay transmitter. That happened years ago during the 1990s, prior to the time when **WBCQ** began using that frequency for its daily licensed broadcasts from Monticello, ME.

❖ Pirate Transmitter Web Site

Although broadcasting without a license remains illegal in North America and the rest of the world, there is a subculture that follows hardware developments in the pirate broadcasting field. *The Official Pirate Radio Kit Site* boldly claims to be the top internet web site that catalogs news and techniques related to pirate radio transmitters.

If you would like to check out this information resource, the web site can be accessed at **http://members.tripod.com/~transmitters/** The site contains more than 100 links to hardware manufacturers and retailers.

❖ Radio Barretina Closes

Per **Radio Dr. Tim** in the Netherlands via DXplorer, **Radio Barretina International,** the Europirate that created considerable DX excitement during its operations from Catalina Island in Spain, has closed down following a visit from the Spanish PTT. During the semi-bust of the station, officials claimed that this station was interfering with a French maritime station. Since the operator cooperated with authorities, it is still not clear whether a monetary forfeiture will be enforced.

❖ Retirements

Three of our reporters to this column have announced their retirement from the labor force. William T. Hassig has retired after a long career at Illinois Bell. Jim Ronda has retired after a long teaching career at universities in Ohio and Oklahoma. Ed Kusalik has retired after 28 years with the city of Lethbridge, Alberta. Congratulations and best wishes for a well deserved retirement go to all of these fine DXers!

❖ Clandestine Radio Watch

Martin Schoech informs all DXers that his Clandestine Radio Watch web site is back in business, after some downtime over the winter. You should check out this valuable internet resource via **http://www.schoechi.de/crw.html**

❖ What We Are Hearing

Monitoring Times readers heard two dozen different pirate radio stations this month. You can hear them, too, if you use some simple techniques. Pirate radio stations never use regularly announced schedules, but shortwave pirate broadcasting increases noticeably on weekends and major holidays. You sometimes have to tune your dial up and down through the pirate radio band to find the stations, but more than 95% of all North American shortwave pirate broadcasts are heard on **6925 kHz**, plus or minus 30 or 40 kHz.

Captain Morgan- The Captain's longtime format has been classic rock music mixed with audio from the old Outer Limits television show. (None, send loggings to the Free Radio Network)

Channel Z Radio- Their announced format is free form progressive rock, but they also sometimes relay other pirates. (*channelzradio@gmail.com*)

Common Man Radio- Although relatively new, their signature classical music piece by Aaron Copland is beginning to be recognized by pirate DXers. (None known)

Conelrad Radio- Their main theme is disaster radio, with their namesake being the old civil defense radio system in the United States (None)

Derby Shortwave- This seasonal station returned in May with renditions of "My Old Kentucky Home" and a replay of an announcer's call of the Kentucky Derby horse race. (*derbyshortwave@yahoo.com*)

Dit Dah Radio- We still know little about this new pirate whose entire theme is Morse Code. (None, report to the FRN)

KBLU- They specialize in blues music. (None known)

MAC Shortwave- Paul Star still hosts this replica of the old top 40 AM radio format, using various frequencies such as 3275, 6850, 6925 and 6950 kHz. (*macshortwave@yahoo.com*)

Maple Leaf Radio- Classic rock and folk music by Canadian artists is their usual format. The Canadian National Anthem is their interval signal. (*radio.mapleleaf@gmail.com*)

Northwoods Radio- Their classic rock music "from the Great Lakes" still features a loon call interval signal. (*northwoodsradio@yahoo.com*)

Radio Appalachia- They combine country and Appalachian music, as the Voice of the Ohio Valley from Moundsville, WV, the home of the WV state pen. (None)

Radio Caliente- This new classic rock music station has been best heard on the west coast of North America, an unusual phenomenon. (None known)

Radio for the Common Man- Although relatively new, their signature classical music piece by Aaron Copland is beginning to be recognized by pirate DXers. (None known)

Radio First Termer- From time to time, somebody relays this documentary about radio stations that broadcast to USA troops during the Vietnam War. (None announced)

Radio Free Whatever- Their rock music tends to be songs that aren't played very often on the radio anymore. (None)

Radio Jamba International- Rock music and ads for the pro-marijuana NORML organization have dominated recent shows. (Belfast)

The Crystal Ship- The Poet's veteran "Voice of the Blue States Republic" is still on variable frequencies such as 5385 and 6700 kHz with classic rock music and leftist political commentary. (Belfast and *tcsshortwave@yahoo.com*)

The Wave- This fairly new pirate is still programming classic rock tunes. The news this month is that they now have an address. (Belfast)

Voice of the Angry Bastard- Their punk rock music is consistent with the tone of the station name. (None known)

Voice of Prozac- This new one is the latest entry in the genre of drug advocacy pirates. (*voiceofprozac@yahoo.com*)

WBNY- Commander Bunny is still running for President of the USA, but he still broadcasts the Voice of the Rodent Revolution as well. (Belfast and *rodentrevolutionhq@yahoo.com*)

Wolverine Radio- Classic rock music remains their primary format. I think that their IDs still sound like "Long Range Radio," but their actual station name is Wolverine. Horacio Nigro heard them from Uruguay via the internet over both North American and European shortwave receiver sites! (None announced)

WHJR, Hey Joe Radio- They play nothing but various versions of the rock song "Hey Joe" by various artists. As we see here this month, they are verifying. (*heyjoe6925@gmail.com*)

Continued on page 61

T.J. "Skip" Arey, N2EI
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Helping Those Who Helped Us Along

If you go to any gathering of amateur radio operators – be it club, hamfest, or public service event – you will probably notice quite a bit of grey hair. For that matter, if many of us look into the mirror in the morning we are probably seeing some of that grey hair on our own heads as well. I will be the first to admit that I am no Spring Chicken. I am beginning to plan for my own retirement.

But I recently went to a ham gathering where I was greeted with someone saying: "Hey…He's young enough to put up the antennas on Field Day!" The demographics of our hobby continue to push up in age despite our efforts to bring young people into the hobby.

I have written in the past about the wonderful resource our older ham brothers and sisters are. Their knowledge of the radio art and their stories about when radio was young are well worth experiencing. Whenever I go to a club with a number of older hams, I always take time to hear their stories. I have met folks who were commercial CW operators, engineers who were there at the birth of television, veterans of D-Day, Iwo Jima and Pearl Harbor. I even met one of the detectives that broke the Lindberg kidnapping case. I always learn a lot about radio and how to become a better ham from their generation. I strongly recommend the practice of eyeball ragchewing with these folks whenever the opportunity arises.

I also learned some other things from senior hams. I learned that many of them had to make difficult choices when they entered their retirement years. Some needed to divest themselves of much (if not all) of their ham gear, either to cover expenses or because they moved into "senior citizen" communities that made ham activity difficult, if not impossible. I learned that some folk's growing infirmity brought on by age can also limit their ability to enjoy the hobby. I even hear that phrase, "Well I just can't get out like I used to," when I ask why someone has stopped coming to club meetings. When one of these fine folks go SK, I learn of family and spouses beset with the difficulty of estate matters related to the passed on ham's equipment and operating history.

Maybe those of us who are a bit younger can repay our mentors for their service to the hobby by helping them out. There are plenty of ways we can help them continue to enjoy the amateur radio hobby in spite of whatever difficulties and setbacks the aging process has brought about. Remember, we are all going to be up in years soon enough. It's time to start setting a good example for those younger than ourselves. We'll be needing their assistance in due course, I can assure you. Some of these ideas can be swapped and shared around the membership of your club. Many hands make light work.

BRING YOUR FRIENDS TO MEETINGS

More than a few senior hams get out of the habit of driving, especially at night. Also, the current price of fuel is tough enough on working folks: You can just imagine how hard it is on someone with a fixed income. If you notice someone is starting to miss meetings, make an effort to find out why and then maybe offer your services to bring them out. The older hams in my neighborhood have always appreciated the offer.

And don't forget other ham activities: Field Day, Hamfests, ARES/RACES events. Another experienced pair of hands is always welcome.

HELP WITH THE INTERNET

While many senior hams have joined the personal computing world, more than a few have difficulty getting on line. Access to the Internet has made so many ham activities more fun. Even renewing your license is a breeze online once you are set up to do it. There are a couple of ways you might proceed here to help your older ham friends.

At the very least, you can invite them around to your shack to assist them with the online bookkeeping for keeping their license, club memberships, and QSL records current. Better yet, if the only barrier to helping your ham friend get on line is a PC, maybe you can scare up an older system you can let them use. You don't need the latest bleeding edge personal computer to do simple e-mail and web browsing tasks. I have pulled PCs out of trash cans and put them back into service.

If you use an open source operating system such as Linux, you can get some substantial performance out of older "obsolete" PCs. Refurbishing orphaned computers for use by older members would make a great club project!

ANTENNA HELP

I wasn't kidding when I said that a group of Old Timers thought my 50-something bones could climb a tower better than they could. I take care of myself so I hope I can scramble up the aluminum for a few more years at least. So, when asked, I am more than willing to offer my services to help less agile hams do routine antenna repair and maintenance.

If you offer me a few of what my late friend Bill Cheek used to call "Barley Pops," that's more than enough compensation for my efforts. Remember to abide by antenna safety procedures, use appropriate safety gear, and hold off on those beers until the work is through.

Again, this can make a great club project, especially if you can donate a little coax and wire along with your time.

OPERATING

I made mention above that some hams can no longer get on the air in a style to which they were once accustomed. I am always reminded of all the shacks I sat in when I was a kid, learning the amateur radio craft from some wonderful Elmers. Time to repay that debt! I enjoy invit-

UNCLE SKIP'S CONTEST CALENDAR

10-10 Int. Summer SSB Contest
August 2 0000 UTC - August 3 2359 UTC

European HF Championship
August 2 1200 UTC - August 2 2359 UTC

North American QSO Party (CW)
August 2 1800 UTC - August 3 0600 UTC

ARRL UHF Contest
August 2 1800 UTC - August 3 1800 UTC

ARS Spartan Sprint (CW)
August 5 0100 UTC - August 7 0300 UTC

North American QSO Party (SSB)
August 16 1800 UTC - August 17 0600 UTC

New Jersey QSO Party
August 17 1600 UTC - August 18 0400 UTC

Ohio QSO Party
August 30 1600 UTC - August 31 0400 UTC

Hawaii QSO Party
August 23 0700 UTC - August 24 2200 UTC

ing my old mentors over to the shack to play radio. Very often, I can give my old friend the opportunity to try out some modes of operation that they are unable to experience in their current circumstances. Showing the guy who taught me CW how to operate PSK31 was one of my favorite ham radio experiences.

A WORD TO REPEATER ASSOCIATIONS

I know it has become popular, and in some cases even necessary, to put subaudible tone control (PL) on your repeater systems. To quote from Robert Frost: "Before I built a wall, I'd ask to know, what I was walling in or walling out."

PL has its place, but I know of one public service group that lost a number of regular repeater members because their older members did not have 2 meter gear that had PL built in. Not everyone can run out and replace their radio to suit a policy change. When your club or repeater group makes technical decisions, try to keep folks on fixed incomes in mind.

This does not mean you shouldn't proceed. Instead you should look into creative ways to keep folks in the operational loop. One possibility is to give your members with older equipment the ability to use a keypad tone to shut down the PL temporarily. Time was when folks *built* their PL boards and tone pads for their radios. I feel another club project coming on!

HOLD AN OLD TIMERS NIGHT

Celebrate the ham radio history of your senior club members. Plan a special night where these fathers and mothers of our hobby are honored in every creative way you can think of. Take a little of the club coffee fund and buy them all new call-sign badges. Ask them to bring out their QSL albums and talk about their most exciting contacts. Go through the club history and find pictures from past field days. Have someone who was Elmered into the hobby by each of these folks stand up and say a few words.

"I'll bet most any Old Timer in the hobby could tell quite a story about building circuits around the 6L6 vacuum tube."

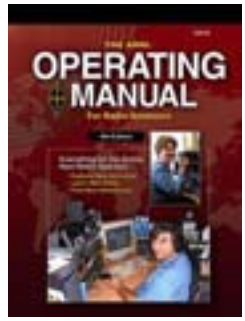
Make a fuss! Most of us are in this hobby because these folks took the time to bring us along. The least we can do is let them know how much their efforts have meant to us. Remember what Ken Kesey said about flowers: Give them while they can still smell them!"

❖ Book Review: The Manual

While our old timers in the hobby have a lot to teach us, there is still a lot to be discovered about the latest amateur radio activities. New modes and methods are coming along on such a regular basis that I feel obliged to let you know about one of the better resources for staying current in the area.

THE ARRL OPERATING MANUAL
9th Edition, ARRL Order # 1093, $29.95
The American Radio Relay League
225 Main Street
Newington, CT 06111-1494
www.arrl.org/shop
1-888-277-5289

I got my first edition of this book back when I was originally licensed as WN2GHA back in 1976. (By the way, the cover price back then was a whole $2.00.) To be honest, that edition stood me well for many years. This was because ham radio, in terms of operational practices, was essentially static. CW, Phone, a little bit of RTTY, and a few guys playing with exotic modes. When the computer/digital revolution came upon us (and the FCC finally woke up to the idea that hams might want to communicate in ASCII and not just Baudot), this time-honored tome got its first update in my shack.



Since then, no edition has yet to skip my notice. Who says ham radio is a dying hobby? We have more ways to play radio than ever before. If you have any doubts about this, a few sessions with this latest edition of the *Operating Manual* will restore your faith in the potential future of our hobby.

Over the years the *Operating Manual* has evolved from a collections of relevant facts to a fine "How To" book to guide any ham at any stage of their career.

Newcomers to the hobby need to receive this book from their club as a reward for passing their first license exam (along with a copy of the study manual for their next highest license). It will serve any beginning ham well in helping them with on-air etiquette and practice.

Experienced hams will find the book to be a useful guide to DXing and contesting procedures, as well as providing the basic information to move forward on investigating a new mode or activity. When Packet Radio and PSK31 came along in the amateur radio arsenal, my first attempts to play with these digital modes occurred with my latest copy of the *Operating Manual* sitting open on my desk.

The reference sections of the *Operating Manual* are invaluable tools during contest activities. Even though I have all the major awards hanging on my wall, I still sometimes forget my A6 from my ZU (look it up!). The *Operating Manual* remains quick way to find out if I am working a rare one or just a unique call from a common country.

Have fun, and help your older ham friends out whenever you can. I'll see you on the bottom end of 40 meters.

MT READERS ONLY

To access the restricted website for the month of August, go to www.monitoringtimes.com, click on the key, and when prompted, enter "mtreader" under the user name. Your password for August is "cbhandle" – Check in each month for new material!

Outer Limits continued from page 59

WMJR Relay- Some pirate has been relaying the oldies rock music from this licensed station in Lexington, KY. (None announced)

❖ QSLing Pirates

Reception reports to pirate stations require three first class stamps for USA maildrops or $2 US to foreign locations for mail forwarding and a souvenir QSL. Letters go to these addresses, identified above in parentheses:
PO Box 1, Belfast, NY 14711
PO Box 109, Blue Ridge Summit, PA 17214
PO Box 146, Stoneham, MA 02180
PO Box 293, Merlin, Ontario N0P 1W0.

Unfortunately, PO Box 69, Elkhorn, NE 68022 is no longer a valid address.

Some pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. The best bulletin for submitting pirate loggings is the e-mailed Free Radio Weekly newsletter, free to contributors via *freeradioweekly@gmail.com*. A few pirates will sometimes QSL reports left on the outstanding Free Radio Network web site, at **www.frn.net**. *The ACE*, a formerly widely read print bulletin, now has a good loggings section and a valuable archive of *Free Radio Weekly* issues on its website at **www.theaceonline.com/**

❖ Thanks

Your loggings and news about unlicensed broadcasting stations are always welcome via 7540 Highway 64 W, Brasstown, NC 28902, or via the e-mail address atop the column. We thank this month's valuable contributors**:** Brian Alexander, Mechanicsburg, PA; John T. Arthur, Belfast, NY; Kirk Baxter, North Canton, OH; Artie Bigley, Columbus, OH; Jerry Berg, Lexington, MA; Richard Cuff, Allentown, PA; Rich D'Angelo, Wyomissing, PA; Bill Finn, Philadelphia, PA; Harold Frodge, Midland, MI; Captain Ganja, Belfast, NY; William T. Hassig, Mt. Prospect, IL; Harry Helms, Corpus Christi, TX; Dan Henderson, Laurel, MD; Ed Insinger, Summit, NJ; Don Jensen, Kenosha, WI; Ed Kusalik, Camrose, Alberta; Chris Lobdell, Tewksbury, MA; Greg Majewski, Oakdale, CT; Larry Magne, Penns Park, PA; A. J. Michaels, Blue Ridge Summit, PA; Don Moore, Davenport, IA; Horacio Nigro, Montevideo, Uruguay; Curt Phillips, Raleigh, NC; John Poet, Belfast, NY; Mike Rhode, Columbus, OH; Jim Ronda, Tulsa, OK; Martin Schoech, Eisenach, Germany; Bob Wilkner, Pompano Beach, FL; and Joe Wood, Greenbriar, TN.

Clem Small, KR6A
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Good, Tough, Flexible, Antennas for HTs

When I was a radio operator in the U.S. Infantry, some of the antennas for our hand-held and backpack radios were made of thin, almost-flat spring steel. The shape of the steel spring was the same as that of the flexible, thin-steel ruler in a retractable tape measure. Those antennas could be folded for storage without breaking them, and when running through heavy foliage they did not break off if they snagged a limb or bush; they just bent and then returned to their original upright position.

You can make antennas similar to those used on the infantry radios by using the metal "measuring tape" from a retractable tape measure as the element. As an antenna for use in emergency situations, they are rugged and can be folded or coiled for storage in a small space. Best if all, they have worthwhile gain over VHF rubber ducks, so, when used in place of the typical VHF rubber duck, they give you a better chance to hear and work those weaker stations.

However, wavelengths are shorter at UHF, so rubber duck antennas for these higher frequencies are often a full 1/4 wavelength long. In that case, our ruler antenna, also being 1/4 wavelength long, is not likely to improve performance over the duck.

❖ Let's Make Some Flexible Antennas:

The flexible ruler that I used to make the antenna elements was approximately 15/16 in (2.4 cm) wide. I tested (flexed) a 1/2 in-wide ruler: I think the 1/2 inch tape would work as an element for UHF, but for the VHF model it was too floppy.

The overall length of either the ruler element, or of the radial wire discussed below can be determined by the formula:

Length (inches) = 2808/frequency (MHz),
or
Length (meters)=7132/frequency (MHz)

For example, for 147 MHz in the 2-meter ham band, length would be 2808/147=19.1 in.

You can choose between the two different techniques described below for attaching the tape antenna element to the male antenna connector. My HT (handie-talkie) uses a BNC connector: yours may be different, so adapt the directions below to your kind of connector as necessary.

Cut the element to length with metal shears. Round the sharp corners, and sand or file any sharpness remaining. At one end of the element, on a spot where you will attach the antenna connector, scrape off the paint completely and completely sand off any bluing that is on the metal under the paint. Use your soldering iron to tin the spots you scraped and sanded on the element. Then slide the element completely in between the double wires, and solder the double wires: one to each side of the element.

I used Kester® 66/44 (60 % tin, 40% lead) rosin-core solder for attaching the element to the wires from the antenna connector: some lower-grade solders wouldn't work. Keep the element and connector aligned such that the antenna will be pointed straight up when mounted on your HT.

The first technique uses a male BNC connector. Obtain a thin wire just small enough to fit into the hole in the back of the pin of the BNC connector (22 gauge, or the solid, inner-conductor wire from small-diameter coax such as RG-58). Solder the wire into the connector pin (fig. 1A). Then solder a doubled 18 or so gauge copper wire to the first wire as shown (fig. 1B). Insulate wires from the connector shell so neither will contact the shell. For this I used several segments of heat-shrink tubing, one over the other, until the wire and tubing would fit tightly into the connector shell (fig. 1C).

Now insert the pin and wire assembly into the connector shell with the end of the doubled wire sticking out the end of the connector. Assemble the rest of the connector (fig. 1D). If the doubled wire extending from your assembled connector is not held relatively solidly in the connector, try again. The idea is to get the overall assembly firm enough to hold the antenna in place on the male connector when the antenna gets rough usage.

Now put an insulating washer over the double wires. I cut my washers from a clear plastic, fast-food container. Neither the wires nor the antenna element should touch the shell of the connector: otherwise the antenna will short out and not work. Solder the element between the doubled wires, snug against the insulating washer (fig. 1E). The antenna is ready to use.

The second technique uses a male BNC-to-female-RCA pin jack adapter as the antenna connector. This technique has the advantage that you can make antenna elements for different bands and change between them using only the one adapter. The disadvantage here is that the elements unplug from the adapter relatively easily, so can be pulled out accidentally during rough usage.

For this second technique, take a male RCA pin plug, and use pliers to bend and remove the outer shell. Hopefully this will leave the male pin with an attached insulating washer (fig. 1F). If yours doesn't leave the

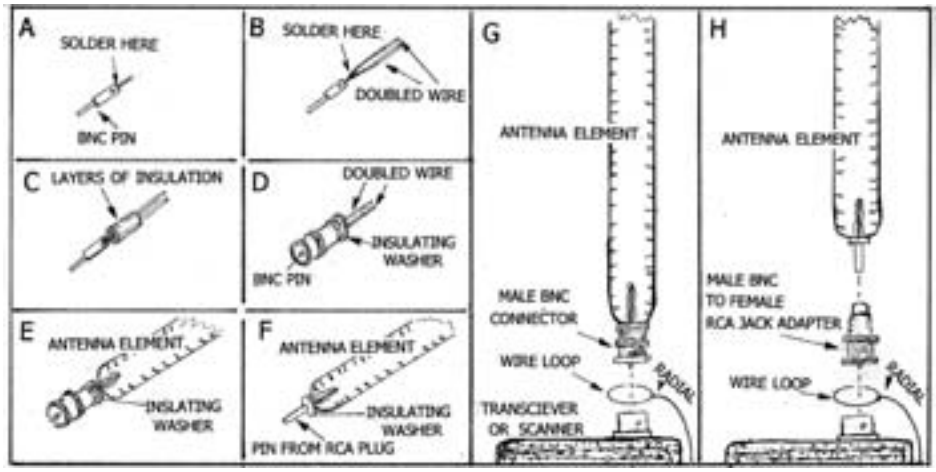

Fig. 1. SOLDERING WIRE INTO BNC PIN (A), SOLDERING DOUBLED WIRE ONTO PIN WIRE (B), INSULATING WIRES (C), ASSEMBLED MALE BNC WITH INSULATING WASHER (D), ANTENNA ELEMENT ADDED TO BNC CONNECTOR (E), RCA PIN WITH INSULATING WASHER ADDED TO ANTENNA ELEMENT (F), CONNECTING ANTENNA AND RADIAL (G & H).

This Month's Interesting Antenna-Related Web site:

Here's a picture of a military tape antenna:
www.armyradio.co.uk/arsc/customer/product.php?productid=1399&cat=82&page=1
How about a measuring-tape dipole for the HF bands?
www.eham.net/articles/16944
Want to make your own rubber duck antennas?
www.arrl.org/tis/info/pdf/9803037.pdf

insulating washer on the end of the pin, you should add one later as described below (figs. 1F &1H).

Make a doubled wire, and solder it into the pin with its ends away from the pin. Then add the insulating washer if necessary and solder the element in place as in the first technique above. Your antenna is now ready to use.

❖ Improved Performance with a Radial:

You can usually improve the weak-signal performance of your VHF HT antenna by attaching a 1/4 wavelength wire radial to the shell (ground connection) of your antenna connector (figs. 1G & 1H). This applies to rubber ducks as well as whip antennas, including this month's tape antennas. Adding a radial on my UHF (440 MHz) HT doesn't give the same increased performance as on VHF.

To make the radial, simply use the length formula given above to cut a proper length of thin, soft, flexible, insulated wire. The wire should hang loosely down from the HT without causing problems. A convenient way to connect the radial is to use a very thin metal washer or a loop of thin bare wire attached to the radial.

Drop the loop or washer over the female antenna connector on the HT before you attach the male antenna connector to the HT. The washer or wire loop must be thin enough to allow the antenna to be attached while the loop or washer is in place. Remember that what you want is a good connection to the shell of either the male or female antenna connector.

RADIO RIDDLES

Last Month:

I asked: "In the early days of air travel, the Zepp antenna was developed for use with Zeppelin lighter-than-air craft. When the Zeppelin was aloft, the Zepp antenna was trailed out below the Zeppelin at the end of an open-wire feed line. So what relevance does the Zepp antenna have with regard to the J-pole antenna?"

Well, actually they are the both same antenna design. The Zepp was a half-wavelength element fed at one end with a quarter-wavelength feedline, just as is the J antenna featured last month.

This Month:

Let's say that we have cut a narrow strip a half wavelength long from the center of a large sheet of metal. We could use that metal strip as a half-wavelength antenna. But how about the hole (slot) left in the metal where the strip was removed? A hole is full of nothing, right? Still, it's a half-wavelength long like the strip we removed, so can we then also use the slot as an antenna?

You'll find an answer to this month's riddle, another riddle, another antenna-related web site or so, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, and 73.

Marc Ellis
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Firing up the BC-221

As this being written, it's mid June and balmy weather has, at long last, come to the Chicago area. When that happens, long-neglected outdoor projects and errands beckon and workbench time suffers. Even so there has definitely been *some* progress on our BC-221 project. But first, a couple of words from the readers.

Kevin Carey, who writes our "Below 500 kHz" column, e-mailed me that he was very pleased to see the BC-221 featured on these pages. He has a BC-221-AK which, like my -AL, offers audio modulation of the generated signal. It's in excellent working condition and has a metallic government sticker that reads "NASA-WALLOPS W08015." Having heard that much of the early space work was done at Wallops Island, he wonders if this instrument could have played a part in it. Anyone have more info?

Bill Thomas (Warner Robins, GA) found a nice BC-221-J abandoned in a shed behind an old house purchased by his church. He was able to download a complete manual from the internet. His unit is an unmodulated version and is apparently an older design, because it has a couple of "ST" style glass tubes (a 6A7 and a 76) where my -AL has metal tubes. Bill built a power supply for his acquisition and has it in operation.

❖ Where We Left Off

Last month, using many clip leads, I haywired an experimental 150-volt voltage regulated power supply for the BC-221. The rectifier was a voltage doubler circuit, working from 120-volt a.c. input, that presented about 300 volts d.c. to a voltage regulator circuit. The latter used an 0A2 (miniature 150-volt regulator) tube.

Ordinarily, a standard full-wave rectifier using a 350-volt or so center-tapped receiver-style transformer would have done this job. The transformer would have also supplied the 6.3 volts to light the BC-221's tube heaters. However, these transformers are now very expensive to buy, even as surplus. And I felt that the voltage doubler circuit would be a practical alternative for readers without well-stocked junkboxes.

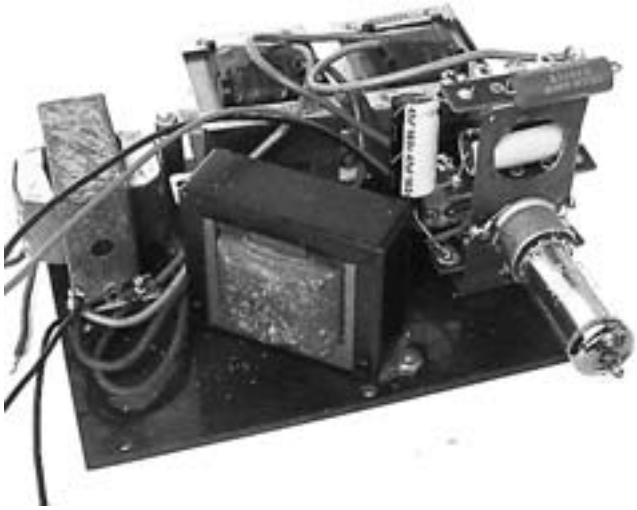
The 120-volt input for the voltage doubler could have been obtained directly from the a.c. line – but this is very a dangerous proposition, as was discussed last month. The solution proposed was to use two small 6.3-volt transformers with their secondaries wired together. Plug one of the primaries into the 120-volt line, and an isolated 120-volts will appear at the other one. And the tube heaters can be powered from the paralleled secondaries.

I did have a couple of nice little low-voltage transformers that were perfect for the purpose, but they had 8-volt secondaries. They did provide the isolated 120 volts, and I could have used a dropping resistor to obtain the heater voltage from the secondaries. However, I decided instead to use a small 6.3-volt filament transformer that I had on hand.

❖ Finalizing the Power Supply

Since the circuit had proven itself experimentally last month, except for an intermittent unexpected current draw that would occasionally extinguish the glow of the regulator tube, I decided to wire it up in more permanent form. The short – or partial short – might have been caused somewhere in my rat's nest of clip leads, or maybe it was occurring somewhere in the BC-221. The best way to find out seemed to be first to finalize the power supply.

I happened to have a piece of phenolic board almost exactly the right size for mounting my back-to-back low-voltage transformers, the filament transformer, the rectifier/regulator circuit assembly, and the latter's outboard filter choke. The board, with its mounted parts, would fit comfortably in the former battery compartment of the BC-221's case. I secured the parts with flat-head screws extending up from the bottom of the board. The bottom of each screw hole was chamfered gently, with a light touch from a 1/4-inch drill bit, so that the screw heads would be flush with the bottom of the board.



The complete power supply assembled on a phenolic board and ready to install in the former battery compartment.

Powering up the supply, as yet not connected to the BC-221, I was pleased to see that the 0A2 tube lit up as expected and that about 24 mA was flowing through it. By design, this was close to its 30 mA maximum rating. Once the BC-221 was turned on with its B plus connected across the tube, its current draw would reduce the current flowing through the tube. This reduced current would have to be over 5 mA for the 0A2 to remain within its regulating range.

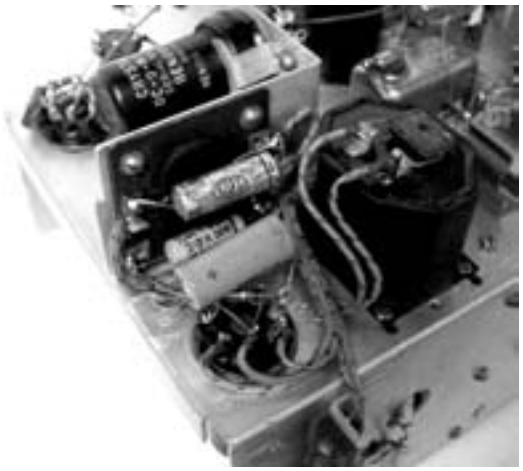
❖ "Rogue Parts"

But before powering up the 221, I carefully looked over the circuitry for owner mods. During an earlier cursory examination, I had noticed a couple of parts that were obviously civilian. These "rogue parts" had no place in a stock BC-221, but I needed to check to see where they were connected in the circuit just to make sure that they hadn't been used as replacements for original parts that had failed.

The schematic diagram in the manual wasn't much help by itself because, thanks to the extensive use of cabling, the circuit was virtually impossible to trace. But with the help of the very detailed pictorial diagram, it was easy to identify the circuit points to which the added parts had been connected.

Apparently, the previous owner had been dissatisfied in some way with the performance of the instrument's audio output stage. A 10 uf electrolytic bypass capacitor had been wired across the 6SJ7 cathode resistor, and a 0.5 uF capacitor had been paralleled across the .02 uF audio coupling cap in the grid lead. I clipped both of these out and, in doing so, noticed that one lead of the electrolytic was loose on its terminal, never having been soldered. I wondered if this had been the source of the intermittent problem I had noticed earlier.

As far as I could tell, the BC-221 was now in stock condition. And, for whatever reason, the intermittent short, or near short, was gone. Powering up the BC-221 while monitoring the current through the regulator tube,



View of bottom of instrument. Paper capacitor marked "Tobe" and electrolytic with "+" marking are "rogue" parts. Behind them is the calibration crystal, which is on a metal tube housing.

I read 24 mA when the unit was first turned on, smoothly declining to a steady minimum of 8 mA. The latter value would vary according to the position of the function switch, because the switch activated various combinations of circuit stages. But it always remained over the 5 mA minimum.

❖ An Unexpected Problem

Slipping on the earphones, I was pleased to hear strong audio beat notes at various positions of the main tuning dial and corrector knob. This was reassuring – a sign that the VFO, crystal oscillator and audio stage were all working, as they had been when powered last month by the haywired supply. But suddenly there was a problem.

Preparing to verify that there were proper beat notes at the various crystal check points, I found that the Low/High bandswitch was virtually immobile. The only way I could move it – and then only with great difficulty – was to replace the pointer knob temporarily with a sturdy round knob that I didn't mind messing up. Grabbing that with a set of channelocks and carefully but firmly applying pressure, I was just about able to move the switch back and forth between its two positions.

A little discouraged, I considered completing the project using another BC-221 (a model -AA) I had in storage. But its bandswitch had the same malady! I went to work on both switches using WD-40, sparingly and strategically. But the two units were physically very different.

I could get at most of the working parts of the -AA bandswitch by taking off an easy-to-remove shield plate. After some experimentation, I was able to restore normal, easy, operation almost immediately by spraying the ball-bearing-and-cam assembly that provided the switch's detent action. Apparently there had once been a lubricant there that had dried up.

The bandswitch on the -AL presented quite a different problem. Instead of being panel-mounted like the -AA unit, it was actuated by a long shaft running through a sleeve in the VFO compartment. The sleeve was accessible by removing the VFO shield cover, but the switch itself was buried within an enclosure that could be removed only by virtually dismantling the heart of the instrument.

I would never be able to properly lubricate the detent, but I was able to work in some WD-40 in between the shaft and the sleeve. With several careful applications of the lubricant, followed by repeatedly working the switch through its two positions, I was able to restore reasonable, if stiff, operation of the bandswitch.

❖ The Disappearing Beat Notes

Now I made a list of the crystal check points for the BC-221-AL, with the idea of making sure that I could obtain a zero beat with the VFO at each one. On the high band, results were fairly good – although occasionally I wasn't quite able to achieve complete zero beat and had to be satisfied with faint low-frequency growling.

On the low band, it was a different story. At some frequencies, the heterodyne I was looking for was displaced a few kHz – getting fainter, and eventually disappearing, as I approached the true check pont. At other frequencies the heterodyne was there, but too weak to be convincing. At still others, there would be two or three robust heterodynes at various positions of the correction knob and it was impossible to choose a stronger one that would be correct.

Top of the BC-221-AL chassis. Tubes are (from left), 6SJ7 audio output, ruggedized 6SJ7VFO, 6K8 oscillator/mixer.

Switching over to the -AA unit and spot-testing several of the crystal check points, I was presented with much the same situation. And by now, I had a guess for the reason: perhaps it was a change in crystal frequency with age. I've had no troubles whatever with my Navy LM meter, which is of the same vintage as the BC-221s and has very similar circuitry.

I think the reason is that the LM has a hermetically sealed crystal, while the BC-221s do not. In fact, back in my past, I seem to remember someone saying that the hermetic crystals would always be fine, but the others were not reliable.

Now my model -AL, and I believe probably the -AA as well, have three internal adjustment trimmers. Two of these parallel the HI and LO band sections of the VFO tuning capacitor, respectively. The technical manual forbids one from messing with either of these on pain of death – or at least on pain of destroying the calibration so that it could be corrected only at specialized BC-221-fixing laboratory.

The third trimmer, however, is in parallel with the crystal and can make modest corrections in crystal frequency. It's used by the calibration lab to make final adjustments too fine to be handled by grinding the crystal.

The BC-221 technical manual is fairly circumspect on this point, but the LM manual is encouraging, suggesting the use of the trimmer to tweak the crystal frequency when it becomes necessary to replace the crystal in the field. The bad news is that, to maintain the accuracy of the BC-221, the crystal should be adjusted against a frequency standard having an accuracy of at least 0.0005%. The good news is that the frequency accuracy of the National Bureau of Standards station (WWV) easily meets this requirement.

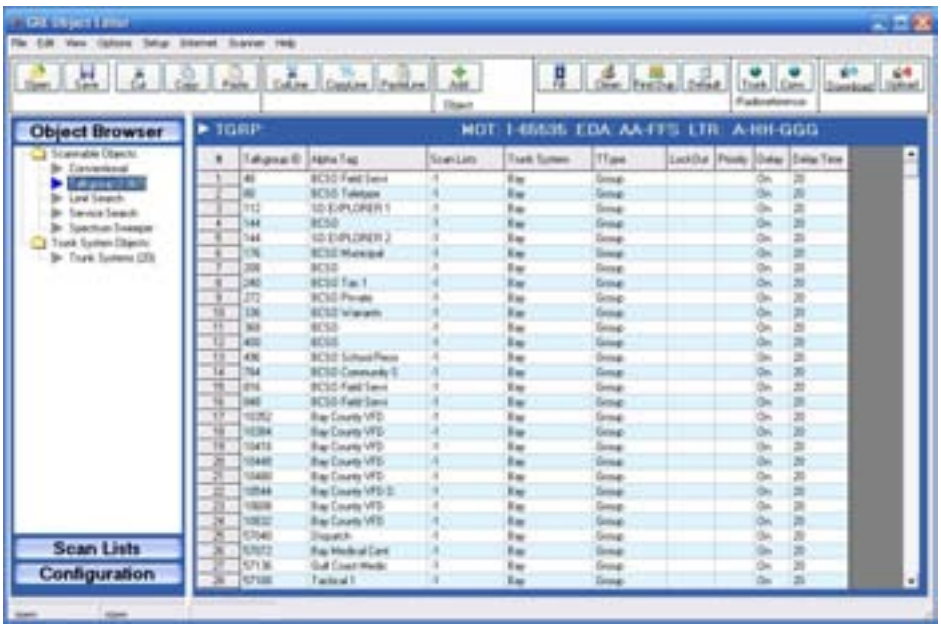
With the BC-221 in the "Xtal Only" position, the calibration crystal will radiate harmonics at 1000 kHz intervals up into the fairly high frequencies. If the signal from the BC-221 is fed into a receiver picking up, say, the 10 MHz transmission from WWV, there will be a beat note if the crystal frequency harmonic at 10 MHz is reasonably close to the frequency of WWV. And if the discrepancy is within the range of the BC-221's trimmer, it will be possible to adjust the crystal frequency to zero beat. We'll try that next time.

Butel ARC-500 Software

By Larry Van Horn, N5FPW

Sometimes it is hard to teach an old dog new tricks. I guess I am one of those radio hobbyists who has a problem with new approaches from time-to-time, especially when I program up the newer generations of scanners. Now don't get me wrong, I love my GRE PSR-500. But, there were some programming concepts I was having some difficulty with. I needed a quick fix and the answer was to let some computer software do the heavy lifting for me.

So, I jumped on the Internet and did some research on what software packages were available for the new GRE scanners. It didn't take long for me to decide on a software package from one of the most reputable names in the scanner software industry – Butel.



Talkgroup listing sorted by alpha tag (Butel)

ARC-500 Features

The software package I decided on was the Butel ARC-500 that works with the GRE PSR-500/600 scanner series. The ARC-500 is compatible with Windows 2000, XP or Vista, and requires either the Radio Shack PC interface cable 20-047 or the GRECOM USB cable to program the scanner. One important caveat when selecting an interface cable: the Radio Shack cables 20-048, 20-049 and 20-289 will not work with the GRE PSR-500/PSR-600 scanners.

This is one of the first scanner software packages that supports 800 MHz rebanding. The ARC-500 allows the user to set up custom tables for rebanded systems, and the new MOT rebanded tables are preloaded as part of the software package. You will be ready to reprogram your 500/600 scanner when your local agency rebands.

The ARC-500 has one of the most versatile memory editors available. This software makes it easy to set up any of the object-oriented parameters that the GRE scanners use to scan various systems. Whether your object-oriented parameter is a non-trunked conventional frequency, trunk talkgroup, limit or service search configuration, or Spectrum Sweeper setup, the spreadsheet type interface makes programming a snap. This spreadsheet interface makes it easy to cut, copy and paste object-oriented data into the program.

There is a nice fill-down/series option available on the toolbar that will copy the data from the first selected row to the remaining selected rows, which saves time and typing redundant text. Some of the useful fields that use the fill option include alpha tags and frequency step.

The EasyFill option is a simple, but powerful option that lets you program data in a range of channels with only a few mouse clicks. You can use the EasyFill to quickly program a range of frequencies in a memory bank so that you can use that memory location as a search bank.

You can move channels up and down in the spreadsheet and the program has several enhanced sorting options. There is also a provision to remove duplicate objects that will help conserve memory locations.

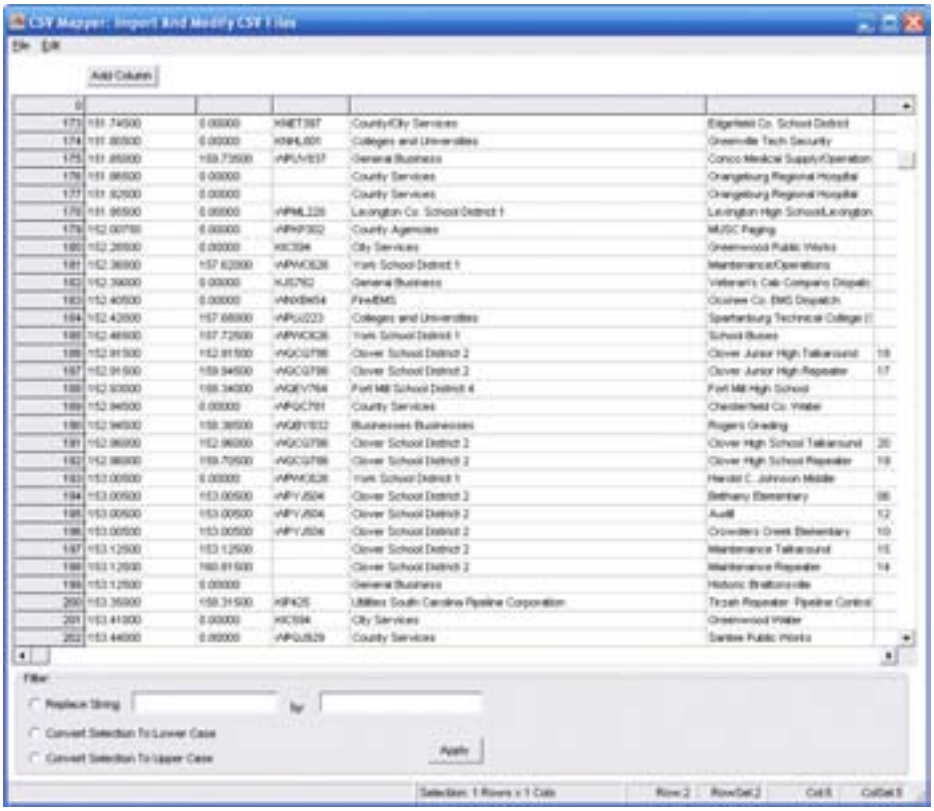
MT RATING: 4 STARS

The program lets you store an unlimited number of scanning configurations on your hard disk. In addition, you can copy, move, swap and preview any of the user programmed scan lists from within the program. The ARC-500 program also lets the user manage and program any of the V-scanner folders prior to loading them into the scanner.

Data entry is easy using whatever Windows preference you are used to – mouse double click, space bar or keyboard shortcuts.

Import/Exporting Data

This program has several import/export options. The program has a **RadioReference.com** import option for conventional and trunk systems. This will make programming your 500/600 scanner easy. In order to use this feature you must have a Radio Reference subscription, which is not included with the ARC5-00 software. There is an enhanced CSV file import and mapper, and you can paste frequencies directly from any website using the program's 'Paste Special.' There is also full Windows clipboard support for importing and exporting data to/from other applications. The program will also export data in the CSV format.



The csv enter/edit screen (Butel)

❖ Virtual Control

The ARC-500 supports virtual control of both the 500/600 scanner. When selected from the tool bar you will see a window pop up that shows the scanner display and controls. The scanner window is large and easy to read and displays a duplicate of what is showing on the scanner display. All of the major controls can be accessed and controlled from this pop up window using your mouse or touch pad.

❖ Bottom line

I really do like this software. It was easy to install (I have used it on a Windows XP/Vista platform). It has made programming the PSR-500/600 much easier than pushing the keys on the scanner.

The documentation that came with the software was an Adobe PDF file. The one downside to the ARC-500 is the manual. I was disappointed with it in general and found quite a few features that were not covered in the manual. The only help file that comes with this program is this PDF manual, and this is an issue which could definitely use some work by Butel.

A plus for the software is that all updates are free for registered users. This will save the user money in the long run.

I purchased the Butel ARC-500 software package from their website at (**www.butelsoftware.com/**). It is available as a download or you can purchase a CD-ROM from various U.S. dealers. The retail price is US$39.95.

So, if you are having fits programming your GRE PSR-500/600 scanner and haven't figured out yet what the GRE object oriented programming is all about, you should seriously consider purchasing the Butel ARC-500 software package. It will reduce your frustration and make the task of loading up your new scanner much easier and faster.

Assemble Your Scanning "Go-Kit"

Be ready to monitor important communications during an emergency

By Joseph Pasquini

Hurricanes… Wildfires… Tornadoes… Ice Storms… Flooding… Blackouts.

No matter the type of emergency or its breadth, there will almost undoubtedly come a point in your life when you are faced with the need to seek shelter. Likewise, if you are a trained responder, you may also be called upon to assist others in need. Such situations require the timely dissemination and receipt of accurate and reliable information.

As scanning enthusiasts, we are already familiar with radio communications and the value of information that such exchanges can provide to both the intended recipient as well as the monitoring public. Unfortunately, the rapid turn of events that are so common during an emergency often negates our ability – no matter how well-intentioned – to simply grab a portable scanner and go where we need to go and do what we need to do to protect our families and ourselves. Additionally, as we all know, what we monitor on the airwaves doesn't necessarily equate to what is ultimately reported by the news media. Unless we are prepared, events can move too fast and they quickly get the better of us and our ability to discern and act upon vital information.

One tool that many first responders leverage is that of the "go- kit." The principle behind such a kit is simple: Develop and maintain a means to get immediate access to the basic tools and accessories you will need to effectively do your job for a pre-determined period of time during an unanticipated event. What such a kit consists of depends upon the projected duration and scope of events one might encounter.

This "Go-Kit" methodology is also utilized by some amateur radio operators who volunteer to provide emergency communications to governmental and charitable organizations during disasters both great and small. The same concept is also sometimes used to help facilitate communications efforts during public service events.

Scanner enthusiasts can benefit from the go-kit concept as well! Virtually all of us have at least one portable scanner. The inclination to simply think, "I'll just take my scanner and go!" is a natural one. However, it would also quickly prove to be inadequate in all but the most straightforward instances.

Basic items such as a pad of paper and a pencil can prove invaluable for recording information. But, what else might you need? While the list of items needed for a scanning go-kit isn't overwhelming, it is useful and easy to assemble.

❖ Develop a Checklist

Before you can truly start to assemble an effective scanner go-kit, you need to give some consideration to the typical type – and especially the duration – of events which you might face. Events of shorter durations will obviously require fewer kit supplies than events of longer duration. The more supplies you need, though, the larger your kit bag or box will need to be.

In addition, you should also consider how often you expect to refresh your kit. For example, stocking your kit with lots of extra batteries for your radio(s) and other battery-consuming tools makes perfect sense. However, what about battery shelf life? There's nothing worse than having a slew of batteries, only to find that they're all dead when you need them most!

At a minimum, your scanner go-kit should include the following components:

- A scanner with antenna (of course!)
- Extra batteries or battery packs
- Pen and pencil
- Small pads of paper
- A flashlight

Other items you may want to also incorporate into your kit include:

- An AC power adapter/charger
- A DC power adapter/charger
- A telescoping antenna
- An antenna hanger for mounting the antenna on a window or file cabinet
- BNC and/or SMA adapters (as appropriate)
- A copy of your scanner's manual
- A hardcopy listing of all of the systems and frequencies programmed into your radio
- Small bandages, moist towelettes and hand sanitizer
- A good quality multi-tool (you never know when this might come in handy)
- Some basic food snacks like an energy bar.

Let's take a closer look at some of your go-kit "must have" items that will build the foundation of your scanning go-kit.

❖ Scanner

OK, I have to admit – I was almost embarrassed to include this basic item at first. But, it quickly became apparent as to why this is probably the most important decision you'll need to make with regards to your go-kit's composition.

Many scanner listeners discover during the course of their hobby – much to the chagrin of their bank account and sometimes even their better half – that they have acquired at least a couple of radios. So, which radio do you allocate to your go-kit? Ideally, you'll add a scanner that is capable of monitoring your local public service entities, NOAA weather radio, local amateur radio/Skywarn frequencies and public utilities. The ability to receive AM/FM or TV broadcasts (well, at least while they're still analog…) is also very helpful. A scanner such as the *Uniden BR330T* will meet all of these parameters.

Once you've selected your go-kit scanner, you'll need to decide if you want to leave it stowed in the kit at all times or operate it normally until you actually have a need to utilize the kit. There are obvious pros and cons to either approach. If you decide to leave the radio stowed with your go-kit, however, it's important to keep the radio stocked with fresh batteries.

❖ Batteries

On the surface, this item seems like it should not need any further explanation. However, it really does, thanks to two questions: "What kind of spare batteries should I pack?" and "How should I pack them?"

In a nutshell, there are three general categories of AA batteries: rechargeable, alkaline and lithium. Also, let's not forget the proprietary battery packs commonly seen on older Unidens, as well as a slew of portable communication receivers. Rechargeable batteries are great for normal operating and help us to save some money while protecting the environment. Unfortunately, they're not so great when sitting in storage. Alkalines perform well and do last longer in storage. For superior shelf life, lithiums reign supreme and can better tolerate cold temperatures. However, they are also the most expensive choice.

For your go-kit supply, only consider alkalines or lithiums. Leave the rechargeables – even the latest generation hybrids – home for everyday usage. Of course, you don't have much of a choice if your go-kit radio uses a proprietary battery pack comprised of rechargeable batteries. If that's the case, you really should also include the AC charger. Some radios also take "dry-cell"

AA battery packs, which are often available as an optional accessory.

Once you've decided on what kind of batteries to use, you may be tempted to simply loosely toss some spares into your kit. Stop. Don't do this! Loose batteries are a mess just waiting to happen.

Rather, protect your batteries – and your kit – from accidental battery discharge by storing your spare batteries in an appropriately sized battery holder. Such holders are inexpensive and available from numerous online retailers such as Thomas Distributing (**www.thomas-distributing.com ; 1-800-821-2769)**.

Another suggestion that works well is to use the plastic in which your batteries were packaged in the first place. A couple of rubber bands will keep the package together and your batteries neatly organized.

❖ Pen and Pencil / Pads of Paper

How many times in your travels have you had an occasion where you wish you had a pen and paper? There's nothing more frustrating than discovering new activity or a new frequency only to forget about it by the time you arrive home. Instead of losing the discovery, write it down!

While any pen or pencil will suffice for kit duty, you're better off selecting a writing implement that will withstand a little punishment. If you prefer pencils, keep in mind that standard pencils are more prone to breaking, and you likely won't have easy access to a pencil sharpener. A good-quality mechanical pencil is your best bet.

Pen users who want something durable might want to consider a *Fisher Space Pen*. These little pens feature a pressurized ink cartridge capable of writing under virtually all kinds of conditions and temperatures. The Fisher Space Pen retails for around $20 and is available at your local office supply store as well as online. Thanks to a little experimentation, I've found that the refills for these pens also happen to fit a nice variety of pen bodies as well!

While you're shopping for a pen or pencil, don't forget to buy some paper. Specifically, a couple of small notebooks appropriately sized to fit unobtrusively within one of the pockets of your go-kit. Small spiral-bound notebooks can be purchased inexpensively from any of the office supply chain stores.

❖ Flashlight

You never know the kind of conditions in which you may need to utilize your kit. After all, disasters both great and small can happen 24 x 7 x 365. This means you need to be prepared to potentially operate your radio equipment in the dark.

Having a scanner with a backlit keypad will be a definite plus. However, you should also include a quality flashlight in your kit as well – leave the discount store flashlight at home. Ideally, your kit flashlight should be powered by the same kind of battery as your radio.

If you haven't purchased a new flashlight in the past couple of years, you're in for a shock. During this period, there has been a veritable "lu-

men revolution," thanks to major advances in LED technologies. For example, Fenix manufactures an excellent selection of high-powered LED-based flashlights powered by AA batteries and suitable for use go-kit usage.

Featuring a Luxeon Rebel LED rated at 50,000 hours, the super-versatile *Fenix L2D* is a digitally controlled flashlight offering six different levels of output powered by two (2) AA batteries. Two distinct modes of output are selected by turning the bezel on the L2D:

- "General Mode" progresses from 9 lumens (55hrs of runtime) to 40 lumens (10.5hrs of runtime) to 80 lumens (4hrs of runtime) and finally to an SOS signaling mode.
- "Turbo Mode" progresses from a powerful 140 lumens (2.4hrs runtime) to a Strobe function.

Fenix also has a solution for those wishing to take more of a minimalist approach. Featuring a Luxeon Rebel LED emitter rated at 50,000 hours, the *Fenix L1T V2.0* provides its user with two digitally-regulated output levels. Power is provided via a single AA battery. Despite its small profile, the L1T offers an amazing 90 lumens (1.5hrs of runtime) on high power and 15 lumens (15 hours of runtime) on low. Each level is selected by turning the bezel. The L1T also features a tactical tail switch with a momentary On function.

Depending upon your final kit configuration, either flashlight will make an effective addition to your setup. Additional info on both the L2D ($56.50) and the L1T V2.0 ($46.50), along with information on some other interesting offerings, can be found at **www.fenix-store.com ; 866-471-0749**.

❖ Putting It Together

Once you have compiled your checklist, it's then time to give some thought as to what you're going to use to hold all of the items! This part of the selection process is really a personal decision based upon your needs and what you're willing to spend. In all honesty, just about any bag or case will do – whatever works best for you is fine.

That being said, there are some styles of cases and bags that seem to typically rise to the top of the pack. Small "tactical" or "deployment" bags are commonly used for go-kits, as they feature some expandability and lots of attachment points and/or compartments. Bags specifically designed with the needs of law enforcement or military usage in mind often have a pocket specifically dedicated for radio storage.

While a bit steep with a list price of $121.99, Maxpedition's rugged *Operator™ Tactical Attaché* will accommodate your radio, along with just about anything you may want to include in your kit, in a professional as well as functional manner.

Information on this and similar Maxpedition bags can be found on the company's website at **www.maxpedition.com ; 877-629-5556**.

For those looking to save a few dollars, County Comm's *Bail Out Bag (Generation 5)*, which lists at $39.99, offers similar functionality. In addition to the Bail Out Bag, County Comm also offers a complete line of products that you may also find to be useful additions to your scanning go-kit (**www.countycomm.com; 408-244-4750**).

If you're interested in a kit with a smaller profile, Cheaper Than Dirt (yes, this really is their name…) offers their *MOLLE Deployment Bag* in several colors for $12.97. Please visit **www.cheaperthandirt.com** for the details (**800-421-8047**).

Whereas the previous two bags are briefcase-like in both style and functionality, the MOLLE Deployment Bag is more analogous to the size of a waist pack. With lots of pockets for smaller odd and ends, the bag features one main pocket with more than enough room to carry a larger scanner and power adapter. Two smaller side compartments are perfect for carrying spare batteries or even a small handheld FRS or amateur radio transceiver. This bag is difficult to pass up at the low price at which it is offered. Trust me, I know – I ended up purchasing two of them as I was researching this article!

As for cases, small plastic tool boxes or hard-wearing camera cases will work quite nicely. Pelican (**www.pelican.com ; 800-473-5422**), for example, produces a comprehensive lineup of padded carrying cases in all shapes and sizes for just about any situation. In fact, it's not uncommon to see a Pelican case being utilized by emergency responders for safeguarding their equipment.

❖ Closing Thoughts

Hopefully, I've given you some ideas for putting together your very own scanning go-kit. What I have presented has been intended to be used as a starting point for generating your own thoughts regarding "kit building." As you can see, the options are endless. Nevertheless, some core kit components should be considered as essentials.

Whatever you decide, though, keep in mind that the basis behind a go-kit is that it should be functional, yet small enough to actually bring with you! Sometimes, leaving the proverbial kitchen sink at home is just fine.

Starcom feature continued from page 18

Site # Dec (Hex)	City	County	N. Lat	W. Long	Freqs
345 (32D)	Thompsonville	Franklin	37.9451	-88.7081	**866.97500**, **868.40000,** 867.87500, *868.88750*
346 (32E)	Flora	Clay	38.6497	-88.5111	***866.83750, 867.36250,*** *859.21250, 866.31250*
347 (32F)	Junction	Gallatin	37.7553	-88.3681	**867.36250, 868.87500,** *866.83750*
348 (330)	Metropolis	Massac	37.1728	-88.6953	**867.32500, *867.85000,*** *866.48750*
349 (331)	Sparta	Monroe	38.0875	-89.6731	**867.85000, 868.37500,** 859.21250, 867.32500
350 (332)	Greenup	Cumberland	39.2503	-88.1931	**867.31250, 867.83750,** 866.47500
351 (333)	Villa Ridge	Pulaski	37.1517	-89.1681	**866.88750, 867.47500,** *866.42500, 866.95000, 866.36250*
352 (334)	Mozier	Calhoun	39.2939	-90.6617	***866.41250, 866.93750,*** *867.98750, 868.87500*
353 (335)	Caseyville	St. Clair	38.6186	-90.0914	***774.28125, 774.53125, 774.81875, 774.78125,*** *774.03125, 774.59375*
354 (336)	Casey	Clark	39.3067	-87.9486	**866.87500, *867.40000,*** *866.35000, 867.92500, 868.45000*
355 (337)	Godfry	Madison	38.9491	-90.1965	***866.35000, 866.87500,*** *858.21250, 867.40000*
356 (338)	Kritesville	Calhoun	39.1027	-90.6454	**866.85000,** 866.32500, **867.37500**
357 (339) WQDE405	Golconda	Pope	37.3377	-88.4987	**866.85000, *867.37500,*** *866.32500*
358 (33A)	Waterloo	Monroe	38.2744	-90.2397	***775.30625, 775.55625, 775.80625, 774.38175,*** *775.31875, 775.59375, 775.78125, 774.56875, 775.05625*
359A (33B)	E. Carondelet	St. Clair	38.5348	-90.2246	***St. Clair Co. Simulcast***
359B	Belleville	St. Clair	38.5572	-90.0155	**866.22500, *866.56250, 867.16250, 867.70000,*** *866.07500, 866.17500, 866.70000, 866.80000, 867.08750, 867.18750, 867.58750, 867.75000, 868.13750, 868.63750, 868.75000, 868.85000*
359C	Belleville	St. Clair	38.4762	-89.9024	
359D	Mascoutah	St. Clair	38.4319	-89.8117	
359E	Lenzberg	St. Clair	38.2904	-89.8048	
359F	Mascoutah	St. Clair	38.5469	-89.8351	
359G	O'Fallon	St. Clair	38.6251	-89.8916	
359H	Caseyville	St. Clair	38.6302	-90.0109	
359I	Millstadt	St. Clair	38.4606	-90.0907	
359J	E. St. Louis	St. Clair	38.6096	-90.1452	

Sites highlighted in blue or yellow (shaded blocks in b&w) are Simulcast sites, each frequency is duplicated at each listed site.
Known Control Channels or Alternate Control Channels are shown in bold.
Other channels listed may also be used as Control or voice channels.
Frequencies in italics are reported but have not been verified.

Table 2: Starcom21 Master Talkgroups List

Below is a list by number of all known, extrapolated and monitored Talkgroups. These were contributed by users of scanners, software monitoring programs or system users.

1001	Plainfield PD Disp.
1002	Plainfield PD F2
1003	Plainfield PD F3
1004	Plainfield
1005	Plainfield Tac 1
1006	Plainfield Tac 2
1026	Ogle Co Sheriff
1037	Argonne Water Dept
1051	Argonne FD Dispatch
1052	Argonne Fireground
1053	Argonne Security
1054	Argonne
1055	Argonne
1056	Argonne Labs Ops
1057	Argonne Labs Disp.
1058	Argonne
1076	Lee County SO
1077	Testing Water Alarms
1201	Henry County SO
1226	SOS
1227	SOS Police Det 1A
1228	SOS Police Det 1B
1236	SOS
1237	SOS Car to Car
1241	SOS
1277	DNR
1278	DNR
1279	DNR
1280	DNR
1281	DNR Reg 2 Dist 2
1282	DNR Reg 2 Dist 3
1283	DNR Reg 2 Dist 4
1284	DNR Reg 2 Det A
1285	DNR Reg 2 Det B
1351	DuPage Water Comm.
1376	Boone Co Shf Disp
1377	Boone County C-C
1378	Boone County Tac
1451	DuPage For Pres PD
1452	DuPage For Pres
1476	MABB Bldg Sec
2000's:	Tollway Ops/Maint.
2000	ITHA
2001	ITHA
2002	ITHA Maintenance
2003	ITHA (Encrypted)
2004	ITHA Maint Alt North
2005	ITHA
2006	ITHA Maintenance
2007	ITHA
2009	ITHA Maintenance Alt
2010	ITHA Maintenance
2013	Maint Garage M1
2014	Maint Garage M2
2015	Maint Garage M3
2016	Maint Garage M4
2017	Maint Garage M5
2018	Maint Garage M6
2019	Maint Garage M7
2020	Maint Garage M8
2021	Maint Garage M11
2022	Maint Garage M12
2023	Maint Garage M14
2036	ITHA ISPERN Patch
2037	ITHA IREACH Patch
4025	ISU PD Disp
4026	ISU PD
4027	ISU
4028	ISU
4079	SOS Capital Security
4085	SOS Bldg sec. Primary
4086	SOS Bldg sec. Alt.
4091	SOS Dist 3 C-C
4128	IDNR
4129	IDNR D19
4132	IDNR (S. IL)
4501	Corrections Units
4510	Corrections Units
4552	Corrections Units
7000's:	St. Clair County:
7001	Emergency
7005	Command
7006	"County-Calling"
7007	Police Common 1
7008	Police Common 2
7009	Co. Calling Channel
7010	County Common 1
7011	County Common 2
7012	County Common 3
7014	Fire Common 1
7015	Fire Common 2
7016	Common Dispatch
7017	Shf Disp 1 Main
7018	Shf Disp 2 Rural PD
7019	Fire Disp 1 (154.19)
7020	EMS
7021	Shf Rural Law
7023	Unknown User
7031	Computer Support
7036	Zoning/Housing Insp
7038	Housing Auth.
7039	Public Bldg Comm
7041	Hwy Dept Control
7042	Hwy Dept.
7046	Hwy Dept Ch. 4
7047	Hwy Dept Dispatch
7048	Hwy Dept Control
7049	Hwy Dept Ch. 3
7056	Sheriff - Info
7057	IREACH (155.055)
7058	ISPERN (155.475)
7059	IFERN (154.265)
7061	Court Operations
7062	Sheriff Car-to-Car
7063	Sheriff Ops (Occ. Enc)
7064	Sheriff Investigations
7065	Sheriff MetroLink
7066	MidAm Airport Sec.
7067	Shf Detail 1
7068	Shf Detail 2
7069	Shf Detail 3
7070	Sheriff Supervisor
7071	Sheriff Admin
7076	Animal Control
7077	Coroner
7078	Millstadt PD Car-Car
7079	Millstadt Fire/EMS
7080	Events 3
7081	Events 2
7082	Events 1
7089	Mildstadt FD
7091	Scott AFB
7095	Scott AFB
7096	Scott AFB Ramp Net
7097	Scott AFB Fire/Crash
7098	Scott AFB Events 1
7099	Scott AFB Events 2
7101	Mascoutah PD
7103	Stookey Twp Road Patch
7106	Fairmont City
7107	Fairmont City
7108	Fairmont City
7112	County ETSB - Ch 1
7113	County ETSB - Ch 2
7137	Mascoutah PD C-C F2
7144	Shiloh PD Car-to-Car
7171	Roaming Channel
7200	O'Fallon PD
7201	O'Fallon FD
7202	O'Fallon EMS
7207	O'Fallon FD FG
7219	Fairview Hts FD
7220	Fairview Hts
7221	Fairview Hts FD Disp
7222	Fairview Hts FD ops
7223	FH Fire unit-unit
7224	FD Command
7225	FH PD Tac
7226	Fairview Hts FD Insp.
7227	Fairview Hts PD Inv.
7228	FHPD Details
7229	FH Citywide
7230	FH Park Department
7231	Fairview Hts PW
7300's:	Madison County:
7300	Encrypted
7301	Co Animal Control
7302	Unknown Use
7303	Coroner
7304	Shf F4 C-C
7305	Unknown
7306	Zoning ???
7308	County Jail
7311	Shf F2 Disp/C-C
7312	Unknown
7314	Shf Rural Dispatch
7315	Shf F1 Disp
7316	Shf F3 C-C
7317	Shf F4 Inv Encrypted
7318	Shf Inv.
7319	Shf
7320	Shf
7321	Shf Admin
7322	Shf
7232	Shf
7324	Shf
7348	Glen Carbon PD
7349	Glen Crbn PD Car-Car
7400's:	IDNR Reg 4
7402	DNR Car to Car
7404	DNR Reg 4
7410	IDNR Reg 4
9000's:	ISP Zone 1 North
9000	Dist 1-A
9001	Dist 1-B
9002	Dist 2-A
9003	Dist 2-B
9004	(Dist 2-C ???)
9005	Dist Chgo-A Priority
9006	Dist Chgo-B North
9007	Dist Chgo-C Middle
9008	Dist Chgo-D South
9009	Dist Chgo-E Aux
9010	Dist Chgo-F Aux
9011	Dist Chgo-G PS Chan
9012	(Dist Chgo ???)
9013	Dist 5-A
9014	Dist 5-B
9015	Dist 7-A
9016	Dist 7-B
9017	Dist 16-A
9018	Dist 16-B
9019	Dist 17-A
9020	Dist 17-B
9021	Dist 21-A
9022	Dist 21-B
9023	Det 01-a
9024	Det 01-b
9025	Det 02-a
9026	Det 02-b
9027	Det Chgo-a
9028	Det Chgo-b
9029	Det Chgo-c
9030	Det 05-a
9031	Det 05-b
9032	Det 07-a
9033	Det 07-b
9034	(Unknown)
9035	Det 16-a
9036	Det 16-b
9037	Det 17-a
9038	Det 17-b
9039	Det 21-a
9040	Det 21-b
9041	IREACH 01
9042	IREACH 02
9043	IREACH Chgo
9044	IREACH 05
9045	IREACH 07
9046	IREACH 16
9047	IREACH 17
9048	IREACH 21
9049	ISPERN 01
9050	ISPERN 02
9051	ISPERN Chgo
9052	ISPERN 05
9053	ISPERN 07
9054	ISPERN 16
9055	ISPERN 17
9056	ISPERN 21
9057	Local 01
9058	Local 02
9059	Local Chgo
9060	Local 05
9061	Local 07
9062	Local 16
9063	Local 17
9064	Local 21
9065	Car to Car 01
9066	Car to Car 02
9067	Car to Car Chgo
9068	Car to Car 05
9069	Car to Car 07
9070	Car to Car 16
9071	Car to Car 17
9072	Car to Car 21
9073	Inv 01
9074	Inv 02
9075	Inv Chgo
9076	Inv 05
9077	Inv 07
9078	Inv 16
9079	Inv 17
9080	Inv 21
9081	DII Z1A
9082	DII Z1B
9083	EPU Z1A
9084	EPU Z1B
9085	Command Z1A
9086	Command Z1B
9087	Command Z1C
9088	Spec Ev Z1A
9089	Spec Ev Z1B
9090	Critical Incident Z1A
9091	Critical Incident Z1B
9092	TRT Z1A
9093	TRT Z1B
9094	TRT Z1C
9095	Forensic Services Z1
9096	OSC Z1A
9097	OSC Z1B
9098	Tollway Patrol North
9099	Tollway Patrol South
9100	Tollway Patrol C
9109	EMS Link Zone 1
9110	Fire Link Zone 1
9111	Fed Link Zone 1
9112	ISP Radio Techs Z1
9113	Aux Zone 1A
9114	Aux Zone 1B
9115	Aux Zone 1C
9116	Aux Zone 1D
9117	CPD North
9118	CPD South
9141	Det 2-c
9142	ITHA Radio Techs
9143	JRTC Bldg Sec
13000's	ISP Zone 2 Center
13000	Dist 6-A
13001	Dist 6-B
13002	Dist 8-A
13003	Dist 8-B
13004	Dist 9-A
13005	Dist 9-B
13006	Dist 9-C
13007	Dist 10-A
13008	Dist 10-B
13009	Dist 14-A
13010	Dist 14-B

13011	Dist 20-A
13012	Dist 20-B
13013	Det 06-a
13014	Det 06-b
13015	Det 08-a
13016	Det 08-b
13017	Det 09-a
13018	Det 09-b
13019	Det 09-c
13020	Det 10-a
13021	Det 10-b
13022	Det 14-a
13023	Det 14-b
13024	Det 20-a
13025	Det 20-b
13026	IREACH 06
13027	IREACH 08
13028	IREACH 09
13029	IREACH 10
13030	IREACH 14
13031	IREACH 20
13032	ISPERN 06
13033	ISPERN 08
13034	ISPERN 09
13035	ISPERN 10
13036	ISPERN 14
13037	ISPERN 20
13038	Local 06
13039	Local 08
13040	Local 09
13041	Local 10
13042	Local 14
13043	Local 20
13044	Car to Car 06
13045	Car to Car 08
13046	Car to Car 09
13047	Car to Car 10
13048	Car to Car 14
13049	Car to Car 20
13050	Inv 06
13051	Inv 08
13052	Inv 09
13053	Inv 10
13054	Inv 14
13055	Inv 20
13056	DII Z2A
13057	DII Z2B
13058	EPU Z2A
13059	EPU Z2B
13060	Command Z1A
13061	Command Z2B
13062	Command Z2C
13063	Spec Events Z2A
13064	Spec Events Z2B
13065	Critical Incident Z2A
13066	Critical Incident Z2B
13067	TRT Z2A
13068	TRT Z2B
13069	TRT Z2C
13070	Forensic Z2
13071	OSC Z2A
13072	OSC Z2B
13073	EMS Link Z2
13074	Fire Link Z2
13075	Federal Link Z2
13076	Radio Tech Z2
13082	Academy A
13083	Academy B
13084	Academy C
13085	Academy D
13086	Z2 Aux 1
13087	Z2 Aux 2
13088	Z2 Aux 3
13105	ISP Aircraft
13106	ISP Aircraft
13107	ISP Aircraft
16000's:	IMERT/IMAT
16385	Unknown Use
16465	IMERT Units
16466	IMERT Command
17000's:	ISP Zone 3 South
17000	Dist 11-A
17001	Dist 11-B
17002	Dist 11-C
17003	Dist 12-A
17004	Dist 12-B
17005	Dist 12-C
17006	Dist 13-A
17007	Dist 13-B
17008	Dist 13-C
17009	Dist 18-A
17010	Dist 18-B
17011	Dist 19-A
17012	Dist 19-B
17013	(Dist 19-C ??)
17014	Dist 22-A
17015	Dist 22-B
17016	Dist 22-C
17017	Det 11-a
17018	Det 11-b
17019	Det 12-a
17020	Det 12-b
17021	Det 13-a
17022	Det 13-b
17023	Det 13-c
17024	Det 18-a
17025	Det 18-b
17026	Det 19-a
17027	Det 19-b
17028	Det 22-a
17029	Det 22-b
17030	Det 22-c
17031	IREACH 11
17032	IREACH 12
17033	IREACH 13
17034	IREACH 18
17035	IREACH 19
17036	IREACH 22
17037	ISPERN 11
17038	ISPERN 12
17039	ISPERN 13
17040	ISPERN 18
17041	ISPERN 19
17042	ISPERN 22
17043	Local 11
17044	Local 12
17045	Local 13
17046	Local 18
17047	Local 19
17048	Local 22
17049	Car to Car 11
17050	Car to Car 12
17051	Car to Car 13
17052	Car to Car 18
17053	Car to Car 19
17054	Car to Car 22
17055	Inv 11
17056	Inv 12
17057	Inv 13
17058	Inv 18
17059	Inv 19
17060	Inv 22
17061	DII Z3A
17062	DII Z3B
17063	EPU Z3A
17064	EPU Z3B
17065	Command Z3A
17066	Command Z3B
17067	Command Z3C
17068	Spec Ev Z3A
17069	Spec Ev Z3B
17070	Critical Incident Z3A
17071	Critical Incident Z3B
17072	TRT Z3A
17073	TRT Z3B
17074	TRT Z3C
17075	Forensic Services Z3
17076	OSC Z3A
17077	OSC Z3B
17078	EMS Link Z3
17079	Fire Link Z3
17080	Fed Link Z3
17081	Radio Techs Z3
17096	Aux Z3A
17097	Aux Z3B
17098	Aux Z3C
21000's	Champaign MDICE
21001	MET Ops
21002	Testing
21003	MDICE Radio
21004	MET Op/Maint
21005	MET EOC Net
21006	Systemwide Emerg.
21101	Unidentified
21200	EMA Admin
21201	EMA Ops 1
21202	EMA Ops 2
21204	Storm Spotters
21203	EMA Reg 7
21250	Unidentified
21500	Patrol 1
21502	Unidentified
21501	Patrol 2
21503	Unidentified
21504	Unidentified
21505	Parkland PD
21506	Patrol Ops 1
21508	unidentified LE
21507	Patrol Ops 2
21509	unidentified LE
21510	unidentified LE
21511	Parkland PD E
21512	CPD
21513	Unidentified
21514	Unidentified
21515	County Sheriff
21518	Unidentified
21520	Unidentified
21526	All Police
21527	CPD
21528	CPD
21530	UPD and UIPD
21529	PATROL 2 Tac
21531	County Sheriff
21532	Court Sec
21536	Invest 1
21538	Unidentified
21537	Invest 2
21539	Unidentified
21542	Unidentified
22000	Fire Ops 1
22001	Fire Tac
22002	Fireground 1
22003	Fireground 2
22004	Fireground 3
22005	Fireground 4
22010	Hazmat
22011	Tech Rescue
22012	Fire Disp
22013	Fire
22014	Unidentified
22500	Incident 1
22501	Incident 2
22502	Incident 3
22503	Incident 4
22504	Incident 5
22505	Incident 6
22506	Incident 7
22507	Incident 8
22705	Unidentified
22708	Highway 1
22709	Highway 2
22712	Public Works All
22900	UIC Util F1
22901	UIC Util F2
30300's:	S/W Mutual Aid
30300	ITTF Region 01
30301	ITTF Region 02
30302	ITTF Region 03
30303	ITTF Region 04
30304	ITTF Region 05
30305	ITTF Region 06
30306	ITTF Region 07
30307	ITTF Region 08
30320	ITTF Region 09
30321	ITTF Region 10
30322	ITTF Region 11
30323	ITTF Region 12
30324	ITTF Region 13
30325	ITTF Region 14
30326	ITTF Region 15
30328	S/W IESMA
30329	S/W ILEAS
30330	S/W MABAS
30331	S/W IL Public Health
30332	ITTF Incident 1 SW
30333	ITTF Incident 2 SW
30334	ITTF Incident 3 SW
30335	ITTF Region 16
30336	ITTF Region 17
30337	ITTF Region 18
30338	ITTF Region 19
30350's:	McLean County
30350	County Law Tac 1
30351	County Law Tac 2
30352	County Law Tac 3
30353	County Law Tac 4
30354	County Law Tac 5
30355	County Law Tac 6
30356	Co. Law Common
30357	Co Law Mutual Aid
30358	Shf & Rural Disp F1
30359	Shf F3
30360	Shf F4 (Alternate)
30361	Shf CID
30362	Shf F5 - Car-to-Car
30363	Use Unknown
30364	EMA
30365	METCOM Staff
30366	Normal PD F1 Disp
30367	Normal PD F2 C-C
30368	Normal PD F3
30369	NPD (Encrypted)
30370	Normal PD Det.
30371	NPD Encrypted
30372	Normal FD
30373	Co Animal Control
30374	Use Unknown
30375	PD Patch to BPD F2
30376	Use Unknown
30377	Juv Detention Center
30378	PD Patch to BPD F1

RESOURCES

Users of DeLorme's StreetAtlas products, download the StarCom21 map data at:
www.carmachicago.com/profiles

This will show the tower locations statewide notated on the map. Also available at this site are programming files for both UASD and ARC996 that include all sites and GPS coordinates.

Please see these sites for additional and more up-to-date information:

www.radioreference.com/modules.php?name=RR&sid=2324
Radio Reference StarCom21 database

http://groups.yahoo.com/group/STARCOM21
Starcom21 Special Interest Group

John Catalano, PhD
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Radio Control via Voice for $10?!

Since the dawn of computers, everyone realized that the keyboard was a poor human interface. In the early 1960s, Bell Labs and IBM already had R&D programs to find alternatives to the keyboard for computers. Many Japanese companies also joined the search early on, since their language did not lend itself to simple keyboard operation. The concept was simple: voice command input. However, the reliable implementation was not.

In fact, it was not until the mid1970s that XEROX's PARC group found a viable keyboard alternative in what we now call the GUI, graphical user interface. For the computers of the day, the use of a GUI was a challenge.

❖ Fast Forward 20 Years

I can remember being in Las Vegas at a Consumer Electronic Show (or was it COMDEX?) toward the end of the 1990s. As an annual marketing event, the company that I was CEO of had a booth at these shows and demonstrated our new product. Each year I left some time to wander the huge conference and see all the latest computer and consumer electronics hardware.

But that year the star of the show was voice command software from Dragon Speaking. The whole giant convention hall came to a standstill to watch in awe as a company representative controlled a PC with his *voice*! The PC was connected to a huge projection display where MS Word and Excel were put through their paces via her voice, never touching a keyboard. After the demo, people were literally throwing money to buy this hot product. I had my $100 out and above my head to get a copy! Voice command for the PC had finally arrived…and in a BIG way.

❖ More Years Flash By

In 2000 and 2001 in the *Computers & Radio* column we looked at using voice command software with receiver control software. The two voice programs were Game Commander and Microsoft's Game Voice. A lot has happened since then. Computing power has moved up from the 800 MHz Pentium III to the Dual Core 1.6 GHz PCs, which are now common.

So now, in 2008, what can voice command software do to enhance our radio monitoring experience? This month we'll look at VR Commander, a voice to keyboard command program. We'll use it with a few radio control programs to see how easy it is to implement and how well it works. Let's see what seven years of hardware and software development has produced.

❖ From Your Lips to the PC's Keys

VR Commander's operational approach is simple. Using voice recognition techniques, it turns voice commands into keyboard strokes. Using voice commands, it can also run a user-designated file or insert a user-defined text string into an application.

Since it uses voice recognition, it does not require voice training, which saves the long and boring installation requirement of many other voice command software programs.

Version 3.2.0.0 of VR Commander is a 7 Meg program that has relatively modest system requirements: Windows 2000 or XP, minimum RAM of 128MB, at least 4 MB free disk space, Pentium II 450 MHz or faster CPU, a full duplex sound card, and a noise canceling microphone.

Although not mentioned in VR Commander's 34-page User Guide, we ran it on Windows Vista Home Basic SP1 without any problems. The rest of the system was a 1.6 GHz Duo Core CPU and 2 GB of RAM. We used an inexpensive Labtec C-315 headset and boom microphone.

Following the on-screen directions, installation is quick and simple from VR Commander's downloadable file.

❖ Giving Your Program "Ears"

Running VR Commander will bring up its Main Control Panel seen in Figure 1.You can see that there are a number of voice command capable programs pre-loaded in VR Commander. The radio programs in this list – Talk PCR, RadioMax, Ham Radio Deluxe, and WorldStation – are the result of my work with VR Commander. How did I add these? Good question.

Adding a program for voice command is done via the "Create New Template" button seen in the lower right of Figure 1. This displays the Template Editor box seen on the right in Figure 2. The first program to which we will try to add voice commands is Talk PCR, a popular PCR1000 control program. Although no longer supported, it can be downloaded free of charge from **www.mahy.demon.co.uk/talkpcr/talkpcr.htm**

Figure 1 VR Commander's main control panel - A very simple interface

In the top windows of the Editor, we have typed the program's name, Talk PCR. In the next window we enter TalkPCR's executable file name, talkpcr.exe.

❖ Can You Hear Me Now?

Since the program produces keyboard strokes, the user must enter a voice command and tell VR Commander what key(s) to press. This is done in the Command Control Box. On the right side of Figure 2 we have set a command which makes Talk PCR move a control up. We have defined the voice command as "Control UP." In Talk PCR this is a right arrow keystroke. Therefore, in the Command Details section we have checked Number 1, then put the cursor in the "First Key Down" box and pressed the right

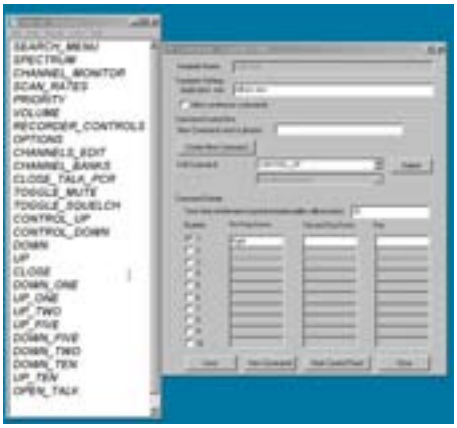


Figure 2 Creating a new template for Talk PCR receiver control program

arrow key. Then save it using the Save button at the bottom.

That's it! You have just programmed your first voice command. Now when the user is running Talk PCR and VR Commander and says "Control Up", VR Commander will "press" the right arrow key. The box on the left in Figure 2 shows all the voice commands we have programmed for Talk PCR.

❖ Some Housekeeping

The user manual suggests that, for each application, we adjust the VR Commander to our hardware, voice amplitude, and our ambient noise environment. Begin this process by clicking the "Start Listening" bar on the bottom of the Main Control Panel. Next click the "Application Settings" button on the Main Control Panel, and the screen in Figure 3 will be displayed. Once it opens we need to perform two more tasks.

Figure 3 Checking for the proper microphone level

First is setting the Noise Rejection Threshold slider control. According to the user guide, a setting of 25 is for a quiet noise environment, 50 for normal, and 75 for noise. For our radio applications, I found that if I use headphones a number around 50 worked well. However, if I was at a desk with the receiver connected to a speaker, a higher number was required and/or a repositioning of the microphone closer to my mouth. Start at 50 and see how that works for your monitoring environment.

Next, position your microphone and speak in your "normal" voice volume. After a bit of lag, a dark bar will be displayed in center of the screen in Figure 3. Adjust the "Set Gain Level" so that the bar is in the center of its travel when you are speaking.

Now we are actually ready to use VR Commander with Talk PCR.

❖ Order Is Everything

As in the command "Ready, aim, fire!" the sequence is *very* important! The procedure for running VR Commander must be followed exactly or unexpected things can result. Not quite as bad as shooting off your foot, but unexpected.

First, each time you create a new template or edit an existing one, I strongly suggest you completely exit VR Commander and restart it. This is done by right clicking on the small program icon located on the right side of the program tray (at the very bottom of your screen). Then choose "Exit".

Now restart VR Commander and highlight "Talk PCR" in the "Select a Template" window. It will appear similar to Figure 1, but with all buttons now accessible and not grayed out. Then click "Load".

Clicking the "View Commands" button will display all the voice commands we have programmed for Talk PCR as seen on the left side of Figure 1. I found this very helpful.

❖ Can You Hear Me Now?

Here we go. Begin by selecting the "Start Listening" at the bottom of the Main Control Panel.

OK. Now start the target program, in this case Talk PCR, in the normal manner. Once Talk PCR is running, we must focus Windows on one of Talk PCR's control knobs by clicking on it. We will find that this last important step varies with each different program we use with VR Commander. For our first try, let's control the receiver's volume. So we would click on Talk PCR's volume "knob."

Now say one of the commands we have programmed, such as "Control Up". VR Commander will "press" the corresponding key and you will see the volume knob move up and the volume get louder. Sweet!

Commands which are not related to control "knobs," such as opening menus, usually do not require prior mouse manipulation. In fact, we will see that in some programs no mouse movement is needed for many commands.

There is a certain amount of technocratic pleasure when the user says "Toggle Mute" and Talk PCR's volume control changes color while the receiver's audio disappears. It really is a feeling of powerful machine control.

❖ Some Better Suited Than Others

VR Commander worked pretty well with Talk PCR. But remember, we can only control commands which can be accessed via keystrokes. In this world of GUIs, many programs have "screen-click-only" commands, not directly accessible via the keyboard. This fact makes total voice command of most radio programs impossible.

However, the major functions of Talk PCR and the older, venerable RadioMax lend themselves well to VR Commander. RadioMax has been around for over eight years, costs $45 and can be downloaded from **www.datadeliverydevices.com/RadioMax.htm** .

Ham Radio Deluxe, a freeware program which gladly accepts donations, is available at **http://hrd.ham-radio.ch/default.htm** . HRD works pretty well with VR, but since it relies heavily on GUI mouse position, it is limited. But VR Commander can still play a role in its operation.

Because of their programming structure, some programs are more "VR Commander" capable. WorldStation from Dxtra, which we recently looked at in this column, possesses many of these favorable traits.

For example, entering new frequencies in Talk PCR or Ham Radio Deluxe via voice commands is quite tedious. Quite frankly, it's barely worth the effort and time, requiring numerous "number" then "move digit" then "number" and so on.

But using VR with WorldStation, the user only needs to say each number of the frequency and then say "Enter". WorldStation works like a charm with VR Commander, even allowing the user to insert the decimal "point" like a number. The ease of inputting frequencies – a frequently recurring task – takes voice command from gadget to useful tool.

In addition, World Station's numerous and comprehensive frequency tables are easily "called up", displayed, and closed using voice command. Again, not all commands/controls are accessible via keyboard and therefore not to VR Commander either.

When using WorldStation, click on a "metal" part of the radio's front panel. This is the main focus point for VR Commander. The new version 4.2 of WorldStation with even more features and functions is now available. Check WorldStation's availability and price for your receiver/ transceiver at **www.dxtra.com**.

❖ Say Your Mind

If the user takes care to enunciate his speech AND keep constant voice amplitude, VR Commander works quite well. Yes, you will find that you will need to repeat a command occasionally. And very rarely it will perform the wrong command. I found that both of these errors can be greatly reduced by choosing voice commands that are different from each other, short, have a number of "hard" sounding letters, and a minimum number of syllables.

Remember to restart VR Commander after a template has been created or edited and to start the target program after VR Commander is running.

Ultimately, the "keyboard" friendliness of the target program will define how useful VR will be. If the target program's user manual has a keyboard command chart, you're in business. If not, press the "ALT" key and explore the target program's command menu for multiple keystroke access. With some patience you can set up VR Commander to do them easily. Take some time, be creative, and get your favorite radio programs under your voice's command.

VR Commander has other interesting and useful functions, which are detailed in its User's manual. If you're a gamer, then the program can serve double duty.

VR Commander is available at **www.vrcommander.com** (VR Commander, 800 9th Ave South, Kirkland, WA 98033). A free demo can be downloaded from the site. BUT, would you believe, the total cost for the full program is $9.95. That's not a typo. It really is $9.95! Tell them you saw it in *MT's Computers & Radio*.

Now, "go enjoy voice control of your radio programs." That's a command.

What's NEW

Tell them you saw it in Monitoring Times

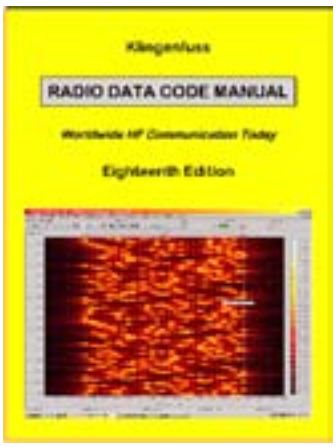
Klingenfuss Radio Data Code Manual

I have had the opportunity over the last 30 years to observe first hand the changes that have taken place in the HF radio spectrum. If you dial the clock back in time and look at past issues of *Monitoring Times* magazine (specifically the *Utility World* and *Digital Digest* columns), you will notice that the HF radio spectrum of yesterday looks nothing like the HF spectrum of today. Nowhere is this more dramatically demonstrated than in the digital modes used on HF frequencies.

Long gone are worldwide press services using RTTY, aeronautical digital services, and a host of maritime stations that used to use CW (Morse code), to name a few. And while some old-timers claim the bands are dead and shortwave is being abandoned, nothing could be further from the truth. The bands are as active as ever, but the modes and services transmitting on HF have changed. It's the listening hobby that, for the most part, has not kept up with the times.

If you want to get on board this changing world of HF digital communications, one publication stands out above all the rest – the Klingenfuss *Radio Data Code Manual*. Now in its 18th edition, Jorge Klingenfuss has literally compiled an encyclopedia of digital information for the HF radio spectrum in this voluminous publication.

This totally revised, 18th edition has more than 600 pages with 131 new graphics and screenshots. This standard international reference book is indispensable for identifying HF radio stations using various digital modes.



The 18th edition covers:

Digital data transmission systems/modulation types with screenshots taken from a Wavecom W61 Digital Analyzer. These digital data transmission systems cover everything from ACARS to Twinplex. Thirty four systems and variants are covered in this book include: ACARS ALE ALF-RDS ALIS ALIS-2 ARQ-E ARQ-E3 ARQ-M ASCII BULG-ASCII Chirp Sounders CIS-36 MFSK Clover Clover-2 Clover-2000 CODAN Coquelet DGPS DSC DUP-ARQ DUP-ARQ-2 DUP-FEC-2 FAX FEC-A G-TOR GW-CLOVER GW-PACTOR HFDL ICAO-SELCAL ITA2 MFSK-8 MFSK-16 MSI NAVTEX Packet Radio PACTOR PACTOR-2 PACTOR-2-FEC PACTOR-3 Piccolo POL-ARQ PSK-31 PSK-63F PSK-125F RUM-FEC SITOR SP-14 T-PLEX TWINPLEX. Plus military modem standards: MIL-STD-188-110A MIL-STD-188-110B (Appendix B) MIL-STD-188-110B (Appendix C) MIL-STD-188-110B (Appendix F) MIL-STD-188-141A MIL-STD-188-141B (Appendix C) MIL-STD-188-203A-1 MIL-STD-188-203-3 MIL-STD-188-212 STANAG 4285 STANAG 4415 STANAG 4481 STANAG 4529 STANAG 4538 STANAG 4539 STANAG 4591 STANAG 5031 STANAG 5035 STANAG 5066 TADIL-A TADIL-B TADIL-C.

International teleprinter alphabets, Unicode and 33 script tables are detailed and described. Some of the teleprinter alphabets include Arabic, ATU-80 Arabic, Chinese, Cyrillic, Latin, Third-shift Cyrillic, Third-shift Ethiopic, Third-shift Greek, Third-shift Hebrew, Third-shift 6-element Japanese, and Third-shift Korean.

Detailed information on meteorological telecommunications

Various meteorological code forms that aid the monitor in decoding coded weather messages.

Symbolic meteorological letters and groups and 11,494 index numbers of weather observing stations worldwide.

Detailed information on aeronautical telecommunication systems including abbreviations, controller-pilot data communications, and 13,728 aero location identifiers.

For ordering information, refer to **www.klingenfuss.org** or Universal Radio (**www.universal-radio.com**, Book #5104, $59.95 plus shipping. Phone: 1-800-431-3939, FAX: 1-614-866-2339. Universal Radio Inc., 6830 Americana Parkway, Reynoldsburg, OH 43068-4113 USA).

If you plan on really listening to the HF digital spectrum of today, then you need this book on your reference shelf.

– Review by Larry Van Horn

Multipsk 4.9 Released

Speaking of monitoring digital communications, a new version of one of the finest digital monitoring software packages has just been released. Version 4.9 of Multipsk has been posted to the Internet by its author Patrick Lindecker, F6CTE. Multipsk is a sound card decoding program and the standard version is available *free* from his website at **http://f6cte.free.fr/index_anglais.htm**.

If you are an amateur radio operator looking for an excellent software package that will let you work a wide variety of modes commonly used in the ham bands, then Multipsk is worth your time to download, install and learn how to use.

Some of the digital modes supported by Multipsk include:

Phase Shift Keying modes:
BPSK: BPSK31-63-125-250 / CHIP (64/128) / PSK10 / PSKFEC31 / PSKAM10-31-50 BPSK with SSTV: PSK63 F - PSK220F + DIGISSTV "Run"
QPSK: QPSK31-63-125-250
MPSK: MT63

On-Off Keying Modes:
CW / CCW-OOK / CCW-FSK

Frequency Shift Keying modes:
PACKET: 110-300-1200 bauds + APRS+ DIGISSTV "Run"
PACTOR 1 / AMTOR FEC-Navtex / AMTOR ARQ / SITOR A
ASCII / RTTY 45-50-75-100-110-150-200 / SYNOP + SHIP
1382 / GMDSS DSC / ACARS (VHF) / DGPS

Multi Frequency Shift Keying modes:
MFSK8 / MFSK16 (+SSTV)
OLIVIA / Contestia / RTTYM / VOICE
THROB/THROBX
DominoF / DominoEX
PAX / PAX2
Automatic Link Establishment (see www.hflink.com) MIL-STD-188-141A+
ARQ FAE / ALE400 + ARQ FAE
DTMF
JT65 (A B and C)

Hellschreiber modes:
FELD HELL / FM HELL(105-245) / PSK HELL / HELL 80

Graphic modes:
HF FAX / SSTV / PSK SSTV modes (mentioned above) / MFSK116 SSTV (mentioned above)

DSP modes:
Filters / Analysis / Binaural CW reception

The program also includes features such as RTTY, CW, BPSK31, BPSK63 and PSK-FEC31 Panoramics and a TCP/IP digital modem.

Minimum hardware requirements to run Multipsk is a PC at 166 MHz or more operating under Windows 95, 98, NT, XP, and a 100 percent compatible Sound Blaster sound card. The card must be full duplex to operate the DSP modes.

So, if you have a computer

with a sound card as outlined above, and an HF receiver or transceiver (if you want to transmit and are licensed to do so in the ham bands), and you want to jump on the digital sound card revolution, drop by Patrick's website and download this new version of Multipsk. It will open a world of digital listening possibilities in your radio shack.

Logger 32

While I am talking about *free*, I can't resist mentioning one of the best amateur radio logging programs on the planet – Logger 32.

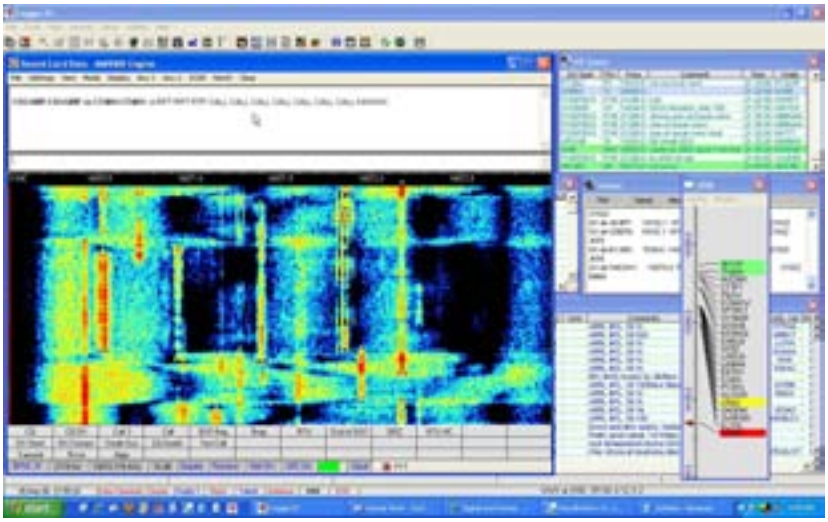
Logger32 is a 32-bit amateur radio logging program written by Bob Furzer, K4CY. Bob is also the author of Zakanaka, and a 16-bit version of Logger.

Logger 32 has been developed to be a highly user configurable, general purpose Amateur Radio logbook with computer control support for many radios and antenna rotators. It is not a contesting log, although there is no real reason why it could not be used for such, and does not contain some features that might be found in software specifically designed for this activity.

Logger32 runs under Windows 95/98, Windows 2000, Windows ME, Windows NT, Windows XP and Windows Vista.

This program is loaded with a lot of features including:

Compatible with early and current ADIF specifications.
Logbook Page Window and Previous QSOs Window can each have up to 47 columns, all user configurable, including IOTA, Grid squares, satellite names, ten-ten etc.
Logbook, Previous QSO, and Worked/Confirmed windows can have the columns presented in any order.
Seven user-definable log entry page items.
Can hold logs more than 1.5 million QSOs.
All Country, County, and IOTA databases are fully editable.
Displays sunrise/sunset, short path distance, long and short path beam headings, and local time for the distant end.
Comprehensive statistics tables for Awards and QSLs.
Real time satellite tracking using Keplerian element sets from a local file or collected from a favored web site.
Grayline display with selectable terminator.
DX spot tables with input from packet or Telnet sources (or both at once).
User-definable worked/confirmed color scheme on incoming spots.
Support for computer control of many ham radio transceivers and includes a debug window.
User-selectable frequency display in kHz or MHz down to 1 Hz resolution.
User-selectable date and time format.
CDROM support.
Support for the use of QRZ.com and GoList via the Internet.
A facility to synchronize your computer's clock to an atomic standard.
All windows fully re-sizable and features to retrieve lost windows when screen resolution is modified.
Supports multiple .INI files for different set-ups (normal, contest, etc.).
Fully configurable fonts, background, and foreground colors.
Auto log-on scripts for Telnet and cluster access, and definable Telnet and cluster shortcuts and scripts.
Personalize you own bandplan.
Prefix statistics available on screen for up to 50 bands and 48 modes.
Previously worked callsigns automatically appear under the callsign entry window (callsign preview).
Support for a parallel port antenna selector that can operate automatically with your bandplan.
Log page can be sorted on QSO#, Callsign, Prefix, Frequency, Band, Mode, CQ Zones, DXCC, Grid Square, IOTA, State, Continent, and ITU Zones.
Logs can be output in either ADIF, UQF, or CSV format.
Supports both multiple users (one log for the family or club station) and multiple logs (one for the main, one for contesting, etc.).
Grid Square Calculator.
Full support for eQSL and Logbook of The World (LoTW).
Functional information buttons in the Logbook Entry Window.
Export QSOs flagged for QSLing and QSLs waiting to be sent are highlighted in the log.
Send DX spots to a VHF cluster or Telnet.
Integration of MMTTY and MMVAri for PSK31/PSK63 and RTTY which includes:
Three independent, simultaneous receive channels in PSK31, Waterfall or spectral signal display; selectable colors for receive and transmit windows (TX and RX windows); selectable frequency markers; built-in macros for use with a selectable number of programmable buttons; capture the received callsign and his name for logging with a click; add QSO number; programmable default RX (initial receive) frequencies; independent AFC and squelch settings for each RX window; selectable waterfall and spectrum display characteristics (color, brightness, smoothing); IMD indication; operate RTTY (including 23 Hz) using MMTTY module written by Mako Mori; sound card timing calibration; split operation using audio tones or using radio control; SO2R compatibility; and built in CW keyer (but no decoder) with programmable buttons and a limited range of macros.
Support for automatic control of your antenna rotator.
Contest serial number counter – up to 999,999 contacts.
User-selectable highlighting for worked, confirmed, QSL send, QSL awaiting printing and general editing.
Single button compression and saving of backup log files.
Built in DVK (Digital Voice Keyer).
Built in Data Terminal with programmable buttons and a range of macros.
Simple conversion utility (Deg. C -> F. etc.).
DX Cluster spots can be displayed on a map and selective filtering of DX spots.
Synchronization of log to download LoTW and/or eQSL records.
Sending and receiving cluster "Announce" and "Talk" messages made simple by using a separate window.
Support for HamCap - a propagation prediction tool written by VE3ENA.
Support for a second CAT controlled radio.
Support for on-line Hamcall lookup.



And the best news is that a new version (3.11.0) has just been released and is available for download from **www.logger32.net/** Again, the price is free, which is guaranteed to warm the heart of any budget conscience ham radio operator.

This is one of the most versatile software packages available for the ham operator and it really puts the operation of your ham shack at your fingertips. So, if you are looking for *free* and need a good ham logging program, jump over to the Logger website and give Logger 32 a try.

Books and equipment for announcement or review should be sent to What's New, c/o Monitoring Times, 7540 Highway 64 West, Brasstown, NC 28902. Press releases may be faxed to 828-837-2216 or emailed to Larry Van Horn, *larryvanhorn@monitoringtimes.com*

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Ads for Stock Exchange must be received 45 days prior to publication date. All ads must be paid in advance to Monitoring Times.
Ad copy must be typed for legibility.

1-3/4" SQUARE DISPLAY AD:
$50 per issue if camera-ready copy or, $85 if copy to be typeset. Photo-reduction $5 additional charge. For more information on commercial ads, contact Beth Leinbach, 828-389-4007.

Attention all those wanting to know what's going on with ham radio in the New Orleans area, check out: **http://groups.yahoo.com/group/GNOAmateurRadio/**

MT BLOGS

Blogs offer an opportunity for columnists to share information that does not make their columns. The news might be too timely for deadline, too short, confined to a small geographical area, too far away to be heard in North America, or even off the columnist's regular "beat." Bookmark these blogs for frequent visits!

MT: AMERICAN BANDSCAN
http://americanbandscan.blogspot.com/ - by Doug Smith

MT: EDITOR'S DESK
(Corrections posted here as well as on MT website)
http://mt-editor.blogspot.com/ - by Rachel Baughn

MT: FED FILES
http://mt-fedfiles.blogspot.com/ - by Chris Parris

MT: MILCOM
http://mt-milcom.blogspot.com/ - by Larry Van Horn

Larry's Monitoring Post
http://monitor-post.blogspot.com/ - by Larry Van Horn

MT: SHORTWAVE
http://mt-shortwave.blogspot.com/- by Gayle Van Horn

MT: UTILITY WORLD
http://mt-utility.blogspot.com/- by Hugh Stegman

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